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A GENERATIVE APPROACH TO THE PHONOLOGY
OF BAHASA INDONESIA

A thesis submitted to the University of London
for the Degree of Master of Philosophy

by
Hans Lapoliwa

School of Oriental and African Studies
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ABSTRACT

This thesis is a transformational generative account of the phonology of Bahasa Indonesia ('Indonesian (language)'), the national and official language of the Republic of Indonesia.

The thesis is organized into six chapters. The first chapter, Introduction, presents a brief description of the background of the thesis. The second chapter deals with the problem of the representation of morphemes both on the phonological and phonetic levels. The discussion is focused on the establishment of units of morpheme representations (i.e. segments and features) which are necessary on the phonological level.

The third and the fourth chapters are devoted to the discussion of the problem of the well-formedness of morphemes in 'Bahasa Indonesia'. In Chapter 3 the discussion is focused on the formulation of conditions which express admissible sequences of phonological elements (C and V) within morphemes. In Chapter 4 the discussion concentrates on the details of the morpheme well-formedness by examining the constraints that 'Bahasa Indonesia' imposes on the distribution of segments within morphemes and on the structure of segments independent from their environments.

The fifth chapter deals with the problem of phonetic forms of morphemes which are different from their underlying forms. The discussion is directed to the formulation of rules which correctly account for

variations in shape that morphemes undergo in various environments and at the same time adequately capture phonological generalisations of 'Bahasa Indonesia'.

Finally, Chapter 6 presents the summary of the study and a number of concluding remarks.

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CHAPTER 1

INTRODUCTION

This thesis is a transformational generative account of the phonology of 'Bahasa Indonesia', the national and official language of the Republic of Indonesia. Each of the subsequent chapters begins with introductory remarks on a number of points, such as theoretical issues on certain aspects of phonology, the model of description adopted, the objective and organization of the chapter concerned, etc. Therefore this introductory chapter presents only a brief account of each of the following:

- a) 'Bahasa Indonesia'
- b) the aim and scope of the thesis
- c) the data - materials and informants
- d) transcriptions, notational conventions, and abbreviations

1.1 'Bahasa Indonesia'

The term 'Bahasa Indonesia' meaning 'Indonesian language'¹ was first introduced by the Second All Indonesia Youth Congress in Jakarta. In their appeal for the unity of various regional youth organizations, so as to make their independence movement stronger and more effective, the delegates to the congress passed a resolution on 28 October, 1928. This resolution, known as Sumpah Pemuda (Youth Pledge) called for loyalty to one fatherland namely

1. The word bahasa itself is derived from Sanskrit bhāṣā 'language'.

'Fatherland Indonesia', to one nation namely 'Indonesia' and to one language namely 'Bahasa Indonesia'. By virtue of this resolution, Malay, the language of eastern Sumatra and the nearby islands (and of the Malay peninsula of Malaysia as well), was adopted and christened 'Bahasa Indonesia' (hereinafter abbreviated BI), and was concomitantly promoted to national language status. The adoption of Malay as the national language of Indonesia under the new name caused no problem mainly because Malay had been used as a lingua franca throughout the archipelago long before the colonial period began in the early years of the 17th century. Moreover, there was no other regional language competing for the national language status. As a matter of fact, since October 1928 BI has been serving as a powerful leverage for national unity and as a main means of inter-ethnic and inter-cultural communication in Indonesia.

Soon after Indonesia proclaimed her independence on 17 August, 1945 BI was constitutionally made as the official language of the Republic of Indonesia.² Thence BI has become a language by means of which major governmental affairs are carried out, a language of instruction at all levels of Indonesian schools, except, of course, in foreign language classes at secondary schools and universities, as well as in foreign language departments of universities or colleges where the foreign language taught is used instead (cf. Halim, 1974: p.8). However,

2. It is stated in the Undang-Undang Dasar 1945 (1945 Constitution) Chapter XV, Article 36 that "Bahasa Negara adalah Bahasa Indonesia" (State language is Bahasa Indonesia).

in regions where BI is considerably different from the local languages, BI is not used as the medium of instruction until the third or the fourth grade of elementary schools.

It must be noted however that for most speakers, BI is their second language. Indonesia is a multi-ethnic and multi-cultural country. Its population, estimated to number over 130 million³ people by the end of 1977 consists of hundreds of ethnic groups, and subsequently almost each one of them has its own language or dialect. According to some scholars, there are about four hundred languages (including dialects) throughout the country (cf. Halim, 1975; Rosidi, 1975 etc). Genetically, these languages (including Malay, and, thus BI) belong to the Indonesian group, and together with the languages of Madagascar, Formosa and the Philippines constitute the Indonesian sub-family⁴ of what is currently known as the Austronesian family.⁵ Apart from Malay, which is the

-
3. The figure is a rough estimate made on the basis of approximately 2 per cent population rate per year of 120.1 million of the 1971 population census (cf. Iskandar, 1975:p.5).
 4. Since the term 'Indonesian' has been used to refer to one of the sub-families of the Austronesian family as well as to the languages of the Indonesian archipelago, it is desirable to use the term BI to refer exclusively to the national and official language of Indonesia, and let the term Malay refer to the language of eastern Sumatra and the nearby islands only (cf. Halim, 1974: p.9ff).
 5. Traditionally the Indonesian languages are grouped under the Malayo-Polynesian family, a term introduced by K.W. von Humboldt, who owed it, to some extent, to Forster (see Fraser, 1892:pp.344-45). For a further account of the term 'Austronesian', the reader is referred to Brandstetter (1916:p.v), Halim (1974:p.9) and the references therein.

basis of BI, Javanese and Sundanese need mention in relation to the development of BI.

Javanese, the language spoken in central and east Java by about half of the population of the whole archipelago, has probably been the most influential local language in the development of BI, partly because the majority of the national leaders are speakers of Javanese and partly because many works in Javanese or about Javanese (including its literature and culture) have gained wide readership both in the country and abroad. The second most influential local language in the development of BI, for similar reasons mentioned above, is probably Sundanese, a language spoken by the majority of the native inhabitants of west Java. It must be noted however that the importance of the regional languages in the development of BI is limited to the enrichment of its vocabulary. Grammar and pronunciation influences are unacceptable in the sense that they are regarded as bad usage. As we shall see later in Chapter 4, the impact of the influence of the regional languages (especially Javanese and Sundanese) on the phonology of BI is marked by the existence of a number of morpheme structures in BI which are, phonotatically, uncommon with respect to the structures of Malay items, such as the occurrence of schwa in the final syllable as in ganteng [gantəŋ] 'handsome', the occurrence of a front mid vowel in the penultimate syllable in words whose final syllable contains a high vowel as in bendi [bendi] 'a gig' etc. The existence of

those 'uncommon' morpheme structures is partially attributable to the influence of foreign languages.

Among foreign languages which play a significant role in the development of BI, particularly in the enrichment of its vocabulary, Arabic, Dutch and English merit mention. Arabic has a remarkable influence mainly through the Moslem religion, the religion of the vast majority of the people, while Dutch and English display their influence through modern sciences, technology and culture as well as through contacts with the western world itself. The impact of such influence on the phonology of BI is marked, in addition to the existence of the 'uncommon' morpheme structures mentioned above, by the acceptance or recognition of some speech sounds and sound combinations which exist neither in Malay or in the regional languages, such as the fricatives /f/ (e.g. in faham 'comprehend, ideology', veto 'veto' etc), /z/ (e.g. in zaman 'era', zat 'substance' etc), /ʃ/ (e.g. in syah 'legal', syarat 'requirements' etc) and /x/ (e.g. in khas 'typical', khusus 'specific' etc), consonant clusters in word initial position as in praktek 'practice' struktur 'structure' etc. (See further discussion of these phenomena in sections 2.2, 3.1 and 5.4. For the correspondences between phonological symbols and orthographic symbols, see section 1.4).

Observation of the speech form of BI shows that the language is far from uniform. This can easily be

understood because the geographical and linguistic background of the speakers is far from homogeneous. The type of BI described in this thesis is that of what may be termed 'Standard Pronunciation', a kind of speech form (pronunciation) which is usually used by educated people and considered appropriate to use in places like schools, on radio and television, in offices etc. The 'Standard Pronunciation' variety is geographically least marked.⁶

1.2 The Aim and Scope of the Thesis

The aim of this thesis is two-fold. One goal is to present an introduction to the phonological grammar of BI. It is an introduction because it does not account for all phonological aspects of BI and it is limited to one type of speech variety of BI. It is also an introduction in the sense that this thesis is an attempt to provide a generative account of the phonology of BI.⁷

The other - primary goal - is to present a phonological description of BI within a transformational generative framework. More specifically, this thesis is concerned with three main problems, namely (1) the representation of BI morphemes both on the phonological

6. Ideally 'Standard Pronunciation' is geographically unmarked (cf. Abercrombie, 1956:p.44).

7. Halim (1974:p.7) points out that the least explored part of BI grammar is its phonology. This is particularly true with respect to the use of a generative approach.

and phonetic levels, (2) the statement of the well-formedness of BI morphemes and segments, and (3) the formulation of rules which correctly account for the phonetic form (in this case 'Standard Pronunciation') of all utterances in BI and at the same time adequately capture phonological generalisations of the language.

The framework adopted in the present description is basically that of Chomsky and Halle as described in their monumental work The Sound Pattern of English. In dealing with the problem of the well-formedness of morphemes however, the model used departs from Chomsky and Halle's in that regularities observed in BI morphemes and segments are, following Stanley (1967), stated in terms of conditions rather than in terms of rules (cf. Chomsky and Halle, 1968:p.171).

The scope of the present description is limited to the word level phonology. Intonation and syntactically-motivated stress are not discussed. To deal with these aspects would certainly result in another thesis.

This thesis consists of six chapters including the Introduction. Chapter 2 is devoted to the discussion of segments and features which are necessary for the representation of morphemes. Chapter 3 deals with the statement of the well-formedness of lexical and grammatical morphemes as well as morpheme combinations in terms of positive conditions. The positive conditions apply only to the phonological (underlying) form of morphemes in BI. In Chapter 4 the question of the morpheme well-

formedness is taken up again. While Chapter 3 is concerned mainly with the canonical shapes of morphemes on the phonological level, Chapter 4 is principally concerned with phonological regularities (or phonological redundancies) observed in the underlying representation of morphemes and segments. The observed regularities are stated in terms of 'If-Then' conditions. These conditions are called 'Morpheme Structure' conditions. Chapter 5 is concerned with the formulation of phonological rules proper (also called phonetic realisation rules). The main function of these rules is to account for variations in shape that morphemes undergo in various environments. Finally, Chapter 6 presents the summary of the study and a number of concluding remarks drawn from the analyses made in the earlier chapters.

1.3 The Data: Materials and Informants

As noted above (cf. Section 1.1), the variety of BI described in this thesis is that of 'Standard Pronunciation' which is defined as a kind of speech form of BI which is usually used by educated speakers and geographically is least marked. Although the writer is an 'educated speaker' of BI, his pronunciation is not by any means free from the influence of his first language (i.e. Mori, one of the languages spoken in Central Sulawesi). To minimise the regional features, the writer has had recourse to the speech of other educated speakers. For this purpose, two sets of materials are used.

The first set, the primary data, is the recordings of 180 words (including phrases) 50 simple sentences and a dialogue of 40 sentences long. The recordings were made in the phonetics laboratory of the Phonetics and Linguistics Department, School of Oriental and African Studies, University of London. To avoid unnecessary mistakes or distortions, the text of the language materials was given to every informant a few days before the recording of his or her reading was carried out.

The informants, five people altogether (including the writer), are Indonesians in their 30's and 40's. Three of them, all men, are post graduate students at the University of London. They come from different parts of Indonesia - Central Java, North Sumatra and Central Sulawesi. The other two, husband and wife, are employed by the university. Both of them come from West Sumatra.

In addition to the above materials, the writer also used another set of materials (secondary data) as a further check on his pronunciation. These materials consist of about 150 words (including phrases), 250 sentences and a conversation of 40 sentences long.⁸ These secondary materials are in a ready-made tape available in the language laboratory of the School of Oriental and African Studies, University of London. Information

8. The materials were originally prepared for foreigners learning BI (cf. Yohanni Johns (1975) Chapter 13).

about the speakers involved in the recordings is not available. As far as can be judged from the recordings, there are four of them, two ladies and two men.

The statements about the features of BI 'Standard Pronunciation' are derived mainly from the primary data on the basis of the features common to the informants. The secondary data are occasionally consulted when the writer is in doubt about a certain aspect. Although the statements are based on the analysis of a body of utterances (corpus), this thesis is by no means a corpus-restricted description of BI phonology. Many items used to illustrate certain points in the course of the study are supplied by the writer either from his own knowledge of the language or from other sources such as dictionaries, grammar books etc., especially in dealing with the problems of the representation and well-formedness of morphemes. This procedure is justifiable because the main difference between BI 'Standard Pronunciation' and the regional varieties of the language lies, as far as generative phonology is concerned, in the system of phonetic realisation rules. Crystal (1969:p.8) writes "To go beyond the corpus is envisaged from the very outset, as ultimately one wants to make statements about the language system as a whole - or, to put it in current generative terms, about the underlying 'competence' which linguistic performance is supposed to reflect..."

1.4 Transcriptions, Notational Conventions, and Abbreviations

1.4.1 Transcriptions

In this thesis, there are three kinds of transcriptions used for the representation of BI items - orthographic, phonological (systematic phonemic) and phonetic transcriptions. A sample BI item may be given in orthographic and/or phonological, and/or phonetic form. Orthographic forms of BI items are underlined. Phonological and phonetic forms are written between slashes (/ /) and square brackets ([]) respectively.

The relationships between phonological forms and the corresponding phonetic forms are described in Chapter 2. The relationships between phonological forms and the corresponding orthographic forms can be described by showing the correspondences between (systematic) phonemes and graphemes (i.e. minimal distinctive units of the orthography) in BI as follows

<u>Systematic Phoneme</u>	<u>Grapheme</u>	<u>Example</u>
/i/	i	/i b u/ - <u>i b u</u> 'mother'
/u/	u	/satu / - <u>satu</u> 'o n e'
/e/	e	/enak/ - <u>enak</u> 'delicious'
/ə/		/emas/ - <u>emas</u> 'gold'
/o/	o	/toko/ - <u>toko</u> 'shop'
/a/	a	/a p a/ - <u>a p a</u> 'what'
/y/	y	/ayah/ - <u>ayah</u> 'father'
/w/	w	/kawan/ - <u>kawan</u> 'friend'
/h/	h	/hari/ - <u>hari</u> 'day'

<u>Systematic Phoneme</u>	<u>Grapheme</u>	<u>Example</u>
/p/	p	/a p a/ - <u>a p a</u> 'what'
	b	/ʔawap/ - <u>jawab</u> 'answer'
/b/		/buka/ - <u>buka</u> 'to open'
/t/	t	/tutup/ - <u>tutup</u> 'to close'
	d	/abat/ - <u>abad</u> 'century'
/d/		/duduk/ - <u>duduk</u> 'to sit'
/k/	k	/kuat / - <u>kuat</u> 'strong'
	g	/gudək/ - <u>gudeg</u> 'spiced rice'
/g/		/gula / - <u>gula</u> 'sugar'
/f/	f, p	/taraf/ - <u>taraf</u> , <u>tarap</u> 'phase'
		/feto/ - <u>veto</u> 'veto'
/s/	s	/saya/ - <u>saya</u> 'I'
/z/	z, s	/azas/ - <u>azas</u> , <u>asas</u> 'principle'
		/zaman/ - <u>jaman</u> , <u>zaman</u> 'era'
/š/	sy, s	/š a h/ - <u>syah</u> , <u>sah</u> 'legal'
/x/	kh	/x a s/ - <u>khas</u> 'typical'
		/axen/ - <u>agen</u> 'agent, agency'
/č/	c	/čuči/ - <u>cuci</u> 'to wash'
/ʃ/	j	/aʃar/ - <u>ajar</u> 'to teach'
/l/	l	/lari/ - <u>lari</u> 'to run'
/r/	r	/rumah/ - <u>rumah</u> 'house'
/m/	m	/muda/ - <u>muda</u> 'young'
/n/	n	/i n i/ - <u>i n i</u> 'this'
/p/	ny	/bapak/ - <u>banyak</u> 'many, much'
/ŋ/	ng	/oran/ - <u>orang</u> 'person'

1.4.2 Notational Conventions

For reference, lists of sample items in each chapter are numbered consecutively beginning with the number of the chapter, similar to those of the sections of the chapter. Numbers referring to examples are different from numbers referring to sections in that they are always enclosed between brackets.

The following are notational conventions used in this thesis.

- [] 'square brackets' enclose phonetic items.
- / / 'slashes, slant lines' enclose phonological items
- || phrase boundary
- + grammatical morpheme boundary
- ++ lexical morpheme boundary, word boundary
- > 'rewritten as'
- ←-- 'derived from', 'analysed into'
- ↓ 'agree with', 'must be', 'go together with'
- * 'reconstructed or hypothetical form', 'unacceptable form'
- ∅ 'zero'

1.4.3 Abbreviations

- Ant Anterior
- BI 'Bahasa Indonesia' ('Indonesian (language)')
- C Consonant
- Cons Consonantal
- Cont Continuant
- Cor Coronal
- IPA International Phonetic Alphabet

MSC Morpheme Structure Condition

NP Noun Phrase

P-rule 'Phonological rule - proper'

Son Sonorant

Syll Syllabic

V Vowel

VP Verb Phrase

CHAPTER 2

THE RELATIONSHIP OF THE UNDERLYING REPRESENTATION TO THE PHONETIC REALISATION

According to Harms (1968: p.12), "The primary aims of generative phonology are to provide a phonemic representation of morphemes and a series of ordered rules that, together with information about boundary phenomena (junctures), (1) adequately express the phonological generalizations of the language and (2) at the same time determine the phonetic form of all utterances in the language." In the literature, the term underlying representation (or phonological representation) is more frequently used by generative phonology writers to mean phonemic representation.¹ Similarly, the term underlying (or phonological) segment is preferred rather than the term phoneme.

The notion of underlying (phonological) form of a morpheme has been associated with 'abstractness' and this has been taken mostly to mean that the underlying form represents one or more phonetic forms of the morpheme in question. In practice, the underlying form chosen for a certain morpheme is usually identical with one of

-
1. In fact the term underlying (phonological) representation in generative phonology is similar to the term morpho-phonemic representation rather than phonemic representation in structural linguistics. This term (morpho-phonemic) is avoided however because it implies that there is a phonemic level of representation between phonological (lexical) and phonetic representation (cf. Chomsky and Halle, 1968: p.11; Chomsky, 1964:p.69; Chomsky, 1966: pp.76-81 etc).

of the occurring phonetic forms of the morpheme.²
 This however is not always the case. The linguist may postulate an underlying form for a morpheme which does not occur phonetically in any environment. Yet the postulated underlying form usually consists of elements (segments) which are phonetically possible in the language. This is to say that the underlying segments postulated for the underlying representation are not simply abstract segments in an arbitrary formula but rather, they are intended to have an explicit phonetic interpretation.³

In this chapter we are going to examine and determine what segments are necessary for the underlying representation of BI morphemes and their phonetic realisation. Sections 1 and 2 deal with consonants and vowels respectively. Section 3 presents the feature composition of the segments set up in the first two sections.

2.1. Consonants

Most works on the phonology of BI recognize that BI makes use of twenty three consonant sounds. These consonant sounds are usually represented by the symbols:

2. This is the main reason why many generative phonologists have the view that the phonological forms of morphemes must be fully specified in terms of phonetic features (e.g. Stanley, 1967; Anderson 1974 especially Chapter 3 etc). This view is adopted in this thesis.

3. Cf. Anderson, 1974:p.47.

[p, b, t, d, k, g, ʔ, f, s, z, ʃ, x, h, ɕ, ʝ, m, n, ŋ, l, r, w] and [y]. (The symbols [ʃ], [ɕ], [ʝ] and [y] are equivalent to IPA symbols [ʃ], [tʃ], [dʒ] and [j] respectively). These consonants may further be characterised in general phonetic terms by means of the following chart.

Chart 1

Manner of Articulation	Place of Articulation				
	Labial	Dental/ Alveolar	(Alveo-) Palatal	Velar	Glottal
1. Plosives (vl)	p	t		k	ʔ
(vd)	b	d		g	
2. Fricatives (vl)	(f)	s	(ʃ)	(x)	h
(vd)		(z)			
3. Affricates (vl)			ɕ		
(vd)			ʝ		
4. Nasals (vd)	m	n	ɲ	ŋ	
5. Lateral (vd)		l			
6. Trill (vd)		r			
7. Approximants (vd) w (Semi vowels)			y		

(Note: vl = voiceless; vd = voiced)

Note that the symbols enclosed between brackets in the above chart do not occur in native BI (Malay) items. They have been introduced into the sound system of BI mainly through Arabic borrowing.

The majority of the works on the phonology

of BI mentioned above claim that the twenty three consonant sounds are linguistically significant in the sense that they are capable of differentiating the meanings of words and, accordingly, each of them qualifies for the label phoneme (see e.g. Halim, 1974; pp.175-76; also Halim, 1972: pp.153-54; Wolff, 1971; p.9; Macdonald and Darjowidjojo, 1967: pp.1-21 etc).

Some scholars however posit twenty two consonant phonemes only instead of twenty three. They claim that the glottal stop ([?]) does not constitute a phoneme but rather it is only an allophone of the phoneme /k/, whose distribution is phonologically definable, that is it occurs in word final position, while [k] (the other allophone of the phoneme /k/), occurs in word-initial and -medial positions (see e.g. Panitia Edjaan Lembaga Bahasa dan Kesusastran 'The Spelling Committee of the Institute of Language and Literature', 1966: pp.5-7; Johns, 1975: pp.8-17 etc).

As far as classical phoneme theory is concerned, one has to take the first position because the two consonant sounds ([k] and [?]) do contrast in a few pairs of lexical items, such as

- (2.1) pak [p a k] 'package' vs pak [p a ?] 'father, sir'
bak [b a k] 'trough' vs bak [b a ?] 'like, as'
sukun [sukən] 'breadfruit' vs suun [su?ən] 'rice noodle'
sakat [sakat] 'parasitic plant' vs saat [sa?at] 'moment,
time'

Note however that the first two items listed on the left

in the above examples are loan words. In general, one can say that the velar stop ([k]) occurs in word final position only in loan words. It will be seen later that loan items, particularly those that contain foreign sounds (i.e. sounds which do not occur in native BI items), have also been the main source of difficulties in setting forth underlying consonants and underlying representation of morphemes. The difficulties arise because the foreign sounds tend to be substituted by some other sounds which occur in native BI items, and accordingly, most loan items tend to have two or more phonetic alternants each.

One fundamental conception in generative phonology is that each morpheme has one and only one base form in the underlying representation, ideally one of the occurring phonetic forms, from which all other variants that occur in different environments are to be derived by rules.⁴ The choice of a certain phonetic form rather than the others as the underlying representation of a morpheme must necessarily be made on a principled basis to the extent that such choice has a simplifying effect on the grammar of the language in question.

Halim (1974) in his brief generative treatment of the segmental phonology of BI postulated all the twenty

4. Cf. Chomsky and Halle, 1968:pp.9-12, 164-66; Anderson, 1974:pp.43, 47; Schane, 1973:pp.74-83; Hyman, 1975:pp.80-82 etc.

three consonants as underlying segments.⁵ The nature and purpose of his description (which was originally intended as an appendix of his Ph.D thesis entitled Intonation in Relation to Syntax in Bahasa Indonesia) allow him to be free from the task of providing some justification for the postulation of those underlying consonant segments apart from a phonemic inventory. Nor does he suggest any procedure or criterion for the choice of a particular phonetic alternant as the underlying form of a morpheme in the case of loan items that have two or more phonetic variants each.

Let us now return to the main question. What consonant segments do we need to postulate as underlying consonants for the phonological description of BI, so that the description captures maximum generalizations of the language? To put it in a different way, do all the twenty three consonant segments have to be postulated as underlying segments in order to achieve the best result? If the same result can be obtained with less underlying segments, it is surely desirable to postulate less segments for the underlying representation.

As has been mentioned earlier in this section, the problems faced in setting up underlying consonant segments revolve around loan items and foreign sounds

5. This is the only generative treatment of BI phonology to my knowledge. The description however is not detailed enough for it is limited to the level of formative and it accounts for six processes only, i.e. vowel nasalization, schwa deletion, vowel laxing, voicing of /h,?/, deletion of /h/ and nasal-obstruent assimilation.

which the loan items have brought along into the sound system of the language. For this particular reason, the discussion in the paragraphs to follow will make a distinction between indigenous sounds (i.e. sounds which occur in native BI words) and loan sounds. Specifically, the fricatives [f, ʃ, z, x] will be discussed separately from the remaining nineteen consonants. The four fricatives ([f, ʃ, z, x]), which are loan sounds, will be discussed after the 19 consonants.

2.1.1 The Consonant System in Indigenous Words.

As has already been indicated in Chart 1 above, the nineteen consonant sounds which occur in native BI (Malay) words consist of seven plosives (stops) ([p, b, t, d, k, g, ʔ]), two fricatives ([s, h]), two affricates ([tʃ, dʒ]), four nasals ([m, n, ŋ, ɲ]), two liquids - one lateral and one trill - ([l, r]), and two semi vowels or glides ([w, y]).

Functionally, the nineteen consonant sounds can be classified into eighteen distinctive sound units known as phonemes. These eighteen consonant phonemes are all postulated as underlying consonant segments and written between slashes (/ /) in informal representation of morphemes. They are /p, b, t, d, k, g, s, h, tʃ, dʒ, m, n, ŋ, ɲ, l, r, w/ and /y/. Note that symbols and names used for the underlying (phonological) consonant segments are similar to those of the phonetic representation.

Before we examine the relationships between the underlying segments with regard to each other (i.e. their

distinctive relation) and between the underlying consonants and their respective phonetic realisation, it is necessary to make a short remark on the nature of the description. The analysis made is on the level of morpheme mainly. Processes that involve underlying segments across morpheme boundaries, such as consonant deletion etc., are however taken into account. In order to establish the identity of a phoneme (i.e. its intrinsic identity which shows that it is different from the other phonemes) a separate minimal pair for every opposed phoneme is given.

2.1.1.1 The underlying consonant /p/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparison.

- (2.2) a. p/b: /paku/ [paku] 'nail' - /baku/ [baku] 'raw material'
 b. p/t: /panah/ [panah] 'arrow' - /tanah/ [tanah] 'land, soil'
 c. p/d: /apa/ [apa] 'what' - /ada/ [ada] 'exist'
 d. p/k: /paraŋ/ [paraŋ] 'knife' - /karaŋ/ [karaŋ] 'rocks'
 e. p/g: -/garaŋ/ [garaŋ] 'grim'
 f. p/s: -/saraŋ/ [saraŋ] 'nest'
 g. p/h: /lapar/ [lapar] 'hungry' - /lahar/ [lahar] 'lava'
 h. p/č: /kupiŋ/ [kupiŋ] 'ear' - /kučiŋ/ [kučiŋ] 'cat'
 i. p/ɟ: /padi/ [padi] 'rice' - /jadi/ [jadi] 'become'
 j. p/m: /palu/ [palu] 'hammer' - /malu/ [malu] 'shy'
 k. p/n: /padi/ [padi] 'rice' - /nadi/ [nadi] 'pulse'

- l. p/p: /paman/[paman]'uncle' -/paman/[paman]'healthy'
- m. p/p: /sədap/[sədap]'delicious' -/sədap/[sədap]'medium'
- n. p/l: /puas/ [puas]'satisfied' -/luas/[luas] 'wide'
- o. p/r: /puas/ [puas]'satisfied' -/ruas/[ruas] 'joint'
- p. p/w: /lipat/[lipat]'fold' -/liwat/[liwat]'to pass'
- q. p/y: /sapa/ [sapa] 'greet' -/saya/ [saya] 'I'

The underlying consonant /p/ is phonetically realised as [p] and produced with lower lip and upper lip as active and passive articulators respectively and without the vibration of the vocal cords. In final position [p] is pronounced without any plosion. But when /p/ occurs after the prefix /mən/ 'active voice verb prefix' (i.e. when /p/ is a stem-initial element) then it will be phonetically realised as [Ø] such as /mən + pukul/ [məpukul] 'to beat', /mən + pakay/ [məmakay] 'to use, to wear' etc. (see Section 5.5 for a further discussion of this phenomenon).

2.1.1.2 The underlying consonant /b/.

This underlying consonant may occur in morpheme initial and medial positions only. Its identity and distinctive function can be established by the following comparison.

(2.3) a. b/p: see (s.s:a)

- b. b/t: /i b u/[i b u]'mother' -/i t u/[i t u]'that'
- c. b/d: /a b u/[a b u]'ash' -/a d u/[a d u] 'to clash'
- d. b/k: -/a k u/[a k u] 'I'
- e. b/g: /bila/[bila]'when' -/gila/[gila] 'crazy'
- f. b/s: -/sila/[sila] 'principle'

- g. b/h: /bilaŋ/[bilaŋ] 'tell' -/hilaŋ/[hilaŋ] 'lost'
 h. b/č: /baraŋ/[baraŋ] 'goods' -/čaraŋ/[čaraŋ] 'twig'
 i. b/ȝ: -/ȝaraŋ/[ȝaraŋ] 'rare'
 j. b/m: /buat/ [buat] 'do, make' -/muat/[muat] 'to load'
 k. b/n: /baik/ [baɪ?] 'good' -/naik/ [naɪ?] 'go up'
 l. b/p: /bata/ [bata] 'brick' -/pata/ [pata] 'real, clear'
 m. b/ŋ: /bəri/ [bəri] 'give' -/ŋəri/ [ŋəri] 'to shudder'
 n. b/l: /buas/ [buas] 'wild' -/luas/ [luas] 'wide'
 o. b/r: -/ruas/ [ruas] 'joint'
 p. b/w: /libat/[libat] 'involve' -/liwat/[liwat] 'to pass'
 q. b/y: /labu/ [labu] 'pumpkin' -/layu/[layu] 'withered'

The underlying consonant /b/ is phonetically realised as [b] produced with lower lip and upper lip as active and passive articulators respectively and the vocal cords are in vibration.

2.1.1.3 The underlying consonant /t/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

(2.4)a. t/p: see (2.2:b)

b. t/b: see (2.3:b)

c. t/d: /t u a/[t u a] 'old' -/d u a/[d u a] 'two'

d. t/k: /satu/ [satu] 'one' -/saku/ [saku] 'pocket'

e. t/g: -/sagu/ [sagu] 'palm like
tree

f. t/s: /atap/ [atap] 'roof' -/asap/ [asap] 'smoke'

g. t/h: /tari/ [tari] 'dance' -/hari/ [hari] 'day'

h. t/č:	-/čari/ [čari] 'to look for'
i. t/ʃ:	-/ʃari/ [ʃari] 'finger'
j. t/m:	-/mari/ [mari] 'come on'
k. t/n: /mata/ [mata] 'eye'	-/mana/ [mana] 'where, which'
l. t/p: /taman/ [taman] 'park'	-/paman/ [paman] 'healthy'
m. t/ŋ: /buta/ [buta] 'blind'	-/buŋa/ [buŋa] 'flower'
n. t/l: /tuaŋ/ [tuaŋ] 'pour'	-/luaŋ/ [luaŋ] 'spare(time)'
o. t/r: /tuaŋ/ [tuan] 'pour'	-/ruaŋ/ [ruaŋ] 'room'
p. t/w: /atas/ [atas] 'top, on'	-/awas/ [awas] 'be careful'
q. t/y: /batu/ [batu] 'stone'	-/bayu/ [bayu] 'wind'

The underlying consonant /t/ is basically realised as [t] on the phonetic level. This consonant is a voiceless unaspirated apico-dental (or apico-denti alveolar) sound. In final position, it is pronounced without any plosion. Some speakers, under the influence of their regional language, use a retroflexed [t] but this variant is considered non-standard.

The underlying consonant /t/ can be realised as [Ø] on the phonetic level, i.e. when it is a stem-initial consonant and occurs after the prefix /mən/ such as /mən + tari/ [mənari] 'to dance', /mən + tulis/ [mənulis] 'to write' etc. (See a further discussion of this phenomenon in Section 5.5).

2.1.1.4 The underlying consonant /d/.

This underlying consonant may occur in morpheme initial and medial positions only. Its identity and distinctive function can be established by the following comparisons.

- (2.5) a. d/p: see (2.2:c)
 b. d/b: see (2.3:c)
 c. d/t: see (2.4:c)
 d. d/k: /duda/[duda] 'widower' - /duka/ [duka] 'sad'
 e. d/g: - /duga/ [duga] 'to guess'
 f. d/s: /duka/[duka] 'sad' - /suka/ [suka] 'to like'
 g. d/h: /dari/[dari] 'from' - /hari/ [hari] 'day'
 h. d/č: - /čari/ [čari] 'to look for'
 i. d/ȝ: - /ȝari/ [ȝari] 'finger'
 j. d/m: - /mari/ [mari] 'come on'
 k. d/n: /dada/[dada] 'chest' - /dana/ [dana] 'funds'
 l. d/p: /sudi/[sudi] 'willing' - /supi/ [supi] 'quiet'
 m. d/ŋ: /sudut/[sudət] 'corner' - /suŋut/[suŋət] 'grumble'
 n. d/l: /dari/[dari] 'from' - /lari/ [lari] 'to run'
 o. d/r: /dada/[dada] 'chest' - /dara/ [dara] 'young woman'
 p. d/w: /ladan/[ladan] 'field' - /lawan/[lawan] 'gate, door'
 q. d/y: /dada/ [dada] 'chest' - /daya/ [daya] 'power'

The underlying consonant /d/ is phonetically realised as a voiced lamino-alveolar sound ([d]). Again, this consonant is often retroflexed by some speakers. Such phonetic realisation however is considered non-standard.

2.1.1.5 The underlying consonant /k/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.6)a. k/p: see (2.2:d)
- b. k/b: see (2.3:d)
- c. k/t: see (2.4:d)
- d. k/d: see (2.5:d)
- e. k/g: /akar/ [akar] 'root' - /agar/ [agar] 'in order'
- f. k/s: /kuku/ [kuku] 'nail' - /suku/ [suku] 'ethnic group'
- g. k/h: /arak/ [ara?] 'to process' - /arah/ [arah] 'direction'
- h. k/č: /kuraŋ [kuraŋ] 'less' - /čuraŋ/ [čuraŋ] 'to cheat'
- i. k/ŷ: - /ŷuraŋ/ [ŷuraŋ] 'gorge'
- j. k/m: /kata/ [kata] 'word' - /mata/ [mata] 'eyes'
- k. k/n: /pəkak/ [pəka?] 'deaf' - /pəkan/ [pəkan] 'week'
- l. k/p: /kata/ [kata] 'word' - /pata/ [pata] 'real, clear'
- m. k/ŋ: /akan/ [akan] 'will' - /aŋan/ [aŋan] 'thought'
- n. k/l: /laku/ [laku] 'sold' - /lalu/ [lalu] 'past'
- o. k/r: /kaya/ [kaya] 'rich' - /raya/ [raya] 'large'
- p. k/w: /katak/ [kata?] 'frog' - /watak/ [wata?] 'character'
- q. k/r: /bakar/ [bakar] 'burn' - /bayar/ [bayar] 'to pay'

The underlying consonant /k/ is basically realised as a voiceless velar stop ([k]) in morpheme initial and medial positions, and as a (voiceless) glottal stop ([ʔ]) in morpheme final position. (See a further discussion of the distribution of these sounds in Section 5.2). When /k/ is a stem-initial segment and it occurs ~~after~~ the prefix /mən/, then it will be phonetically realised as [∅] such as /mən + kata + kan/ [məŋatakan] 'to tell, say', /mən + kasih/ [məŋasih] 'to give' etc. (See Section 5.5 for a further discussion of this phenomenon).

2.1.1.6 The underlying consonant /g/.

This underlying consonant may occur in morpheme initial and medial positions only. Its identity and distinctive function can be established by the following comparisons.

- (2.7)a. g/p: see (2.2:e)
 b. g/b: see (2.3:e)
 c. g/t: see (2.4:e)
 d. g/d: see (2.5:e)
 e. g/k: see (2.6:e)
 f. g/s: /raga/[raga] 'body' - /rasa/[rasa] 'feeling'
 g. g/h: /bagan/[bagan] 'design' - /bahan/[bahan] 'material'
 h. g/č: /agar/[agar] 'in order' - /ačar/[ačar] 'pickle'
 i. g/ȝ: /agar/[agar] 'in order' - /aȝar/[aȝar] 'teach'
 j. g/m: /naga/[naga] 'dragon' - /nama/[nama] 'name'
 k. g/n: /giat/[giat] 'diligent' - /niat/[niat] 'intention'
 l. g/p: /garis/[garis] 'line' - /paris/[paris] 'nearly'
 m. g/ŋ: /təgah/[təgah] 'forbid' - /təŋah/[təŋah] 'half'
 n. g/l: /lagu/[lagu] 'song' - /lalu/[lalu] 'past'
 o. g/r: /lagi/[lagi] 'again' - /lari/[lari] 'run'
 p. g/w: /raga/[raga] 'body' - /rawa/[rawa] 'swamp'
 q. g/y: - /raya/[raya] 'large'

The underlying consonant /g/ is phonetically realised as a voiced velar stop ([g]).

2.1.1.7 The underlying consonant /s/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following

comparisons.

- (2.8)a. s/p: see (2.2:f) b. s/b: see (2.3:f)
 c. s/t: see (2.4:f) d. s/d: see (2.5:f)
 e. s/k: see (2.6:f) f. s/g: see (2.7:f)
 g. s/h: /sari/ [sari] 'essence' - /hari/ [hari] 'day' -
 h. s/č: - /čari/ [čari] 'to look for'
 i. s/ȝ: - /ȝari/ [ȝari] 'finger'
 j. s/m: - /mari/ [mari] 'come on'
 k. s/n: /kəsəl/ [kəsəl] 'annoyed' - /kənal/ [kənal] 'familiar'
 l. s/p: - /kənal/ [kənal] 'elastic'
 m. s/ŋ: /luas/ [luas] 'wide' - /luaŋ/ [luaŋ] 'spare(time)'
 n. s/l: /awas/ [awas] 'careful' - /awal/ [awal] 'beginning'
 o. s/r: /luas/ [luas] 'wide' - /luar/ [luar] 'out side'
 p. s/w: /desa/ [desa] 'village' - /dewa/ [dewa] 'god'
 q. s/y: /saŋ/ [saŋ] 'the' - /yaŋ/ [yaŋ] 'which'

The underlying consonant /s/ is basically realised as a voiceless lamino alveolar fricative sound ([s]). But when the underlying /s/ is a stem-initial consonant and occurs ~~after~~ the prefix /mən/ then it will be phonetically realised as [Ø], such as /mən + sapu/ [məpapu] 'to sweep', /mən + sisir/ [məpisisir] 'to comb' etc. (See a further discussion of this phenomenon in Section 5.5).

2.1.1.8 The underlying (consonant) glide /h/.

This underlying glide may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.9)a. h/p: see (2.2:g) b. h/b: see (2.3:g)
 c. h/t: see (2.4:g) d. h/d: see (2.5:g)
 e. h/k: see (2.6:g) f. h/g: see (2.7:g)
 g. h/s: see (2.8:g)
 h. h/č: /hari/ [hari] 'day' - /čari/ [čari] 'to look for'
 i. h/ȝ: - /ȝari/ [ȝari] 'finger'
 j. h/m: - /mari/ [mari] 'come on'
 k. h/n: /tuah/ [tuah] 'luck' - /tuan/ [tuan] 'master'
 l. h/p: /hawa/ [hawa] 'air' - /pawa/ [pawa] 'soul'
 m. h/ŋ: /buah/ [buah] 'fruit' - /buan/ [buan] 'to throw'
 n. h/l: - /bual/ [bual] 'boast'
 o. h/r: /dahi/ [dahi] 'forehead' - /dari/ [dari] 'from'
 p. h/w: /tahan/ [tahan] 'detain' - /tawan/ [tawan] 'capture'
 q. h/y: /lahar/ [lahar] 'lava' - /layar/ [layar] 'sail'

The underlying glide /h/ is basically realised as a voiceless glottal fricative sound ([h]). When /h/ occurs in intervocalic position, it tends to be phonetically realised as a voiced glottal fricative sound ([ɦ]).

The underlying /h/ can be phonetically realised as [Ø] when it occurs in morpheme final position, such as /rumah/ [rumah, ruma] 'house', /sudah/ [sudah, suda] 'finished' etc., or when it occurs between two non-identical vowels in verbs and adjectives, such as /lihat/ [lihat, liat] 'to see', /pahit/ [pahit, paɪt] 'bitter' etc. (See a further discussion of the zero realisation of /h/ in Section 5.3).

2.1.1.9 The underlying consonant /č/.

This underlying consonant may occur in morpheme initial and medial positions only. Its identity and distinctive function can be established by the following comparisons.

- (2.10) a. č/p: see (2.2:h) b. č/b: see (2.3:h)
 c. č/t: see (2.4:h) d. č/d: see (2.5:h)
 e. č/k: see (2.6:h) f. č/g: see (2.7:h)
 g. č/s: see (2.8:h) h. č/h: see (2.9:h)
 i. č/ʃ: /ačar/ [ačar] 'pickle' - /aʃar/ [aʃar] 'teach'
 j. č/m: /činta/[činta] 'love' - /minta/[minta] 'ask(for)'
 k. č/n: /kučiq/[kučiq] 'cat' - /kuniq/[kuniq] 'yellow'
 l. č/p: /suči/ [suči] 'holy' - /supi/ [supi] 'quiet'
 m. č/ŋ: /pəčat/[pəčat] 'dismiss' - /pəŋat/[pəŋat] 'stew'
 n. č/l: /čoba/ [čoba] 'try' - /loba/ [loba] 'greedy'
 o. č/r: /čuči/ [čuči] 'wash' - /čuri/ [čuri] 'steal'
 p. č/w: /bača/ [bača] 'read' - /bawa/ [bawa] 'bring'
 q. č/y: /kača/ [kača] 'glass' - /kaya/ [kaya] 'rich'

The underlying consonant /č/ is phonetically realised as a voiceless lamino alveolo-palatal affricate ([č](= IPA [tʃ])).

2.1.1.10 The underlying consonant /ʃ/.

This underlying consonant may occur in morpheme initial and medial positions only. Its identity and distinctive function can be established by the following comparisons.

- (2.11) a. ʃ/p: see (2.2:1) b. ʃ/b: see (2.3:1)
 c. ʃ/t: see (2.4:1) d. ʃ/d: see (2.5:1)

- e. ʃ/k: see (2.6:1) f. ʃ/g: see (2.7:1)
 g. ʃ/s: see (2.8:1) h. ʃ/h: see (2.9:1)
 i. ʃ/ç: see (2.10:1)
 j. ʃ/m: /ʃari/ [ʃari] 'finger' - /mari/ [mari] 'come on'
 k. ʃ/n: /ʃadi/ [ʃadi] 'become' - /nadi/ [nadi] 'pulse'
 l. ʃ/p: /puʃa/ [puʃa] 'adore' - /puna/ [puna] 'possess'
 m. ʃ/ŋ: /haʃat/[haʃat] 'desire' - /haŋat/[haŋat] 'warm'
 n. ʃ/l: /ʃari/ [ʃari] 'finger' - /lari/ [lari] 'run'
 o. ʃ/r: /ʃasa/ [ʃasa] 'service' - /rasa/ [rasa] 'feel'
 p. ʃ/w: /saʃa/ [saʃa] 'just' - /sawa/ [sawa] 'python'
 q. ʃ/y: - /saya/ [saya] 'I'

The underlying consonant /ʃ/ is phonetically realised as a voiced lamino alveolo-palatal affricate ([ʃ] (=IPA [dʒ])).

2.1.1.11 The underlying consonant /m/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.12) a. m/p: see (2.2:j) b. m/b: see (2.3:j)
 c. m/t: see (2.4:j) d. m/d: see (2.5:j)
 e. m/k: see (2.6:j) f. m/g: see (2.7:j)
 g. m/s: see (2.8:j) h. m/h: see (2.9:j)
 i. m/ç: see (2.10:j) j. m/ʃ: see (2.11:j)
 k. m/n: /sama/ [sama] 'same' - /sana/ [sana] 'there'
 l. m/p: /hama/ [hama] 'disease' - /hapa/[hapa] 'only'
 m. m/ŋ: /garam/[garam] 'salt' - /garaŋ/[garaŋ] 'fierce'
 n. m/l: /malu/ [malu] 'shy' - /lalu/ [lalu] 'past'

- o. m/r: /masa/ [masa] 'period' - /rasa/ [rasa] 'feel'
p. m/w: /aman/ [aman] 'safe' - /awan/ [awan] 'cloud'
q. m/y: /sama/ [sama] 'same' - /saya/ [saya] 'I'

The underlying consonant /m/ is phonetically realised as a voiced bilabial nasal sound ([m]).

2.1.1.12 The underlying consonant /n/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- [illegible]

The underlying consonant /n/ is basically realised on the phonetic level as a voiced apico dental (or apico denti-alveolar) nasal sound ([n]). The underlying /n/ in the prefix /mən/ is phonetically realised as a voiced

bilabial nasal ([m]) before bilabial plosives such as /mən + bača/ [məmbača] 'to read', /mən + pilih/ [məmilih] 'to choose' etc., as a voiced lamino alveolo-palatal nasal ([ɲ]) before laminal fricatives and affricates such as /mən + sapu/ [məɲapu] 'to sweep', /mən + čari/ [məɲčari] 'to look for' etc., as a voiced dorso velar nasal ([ŋ]) before velar and glottal obstruents and before vowels such as /mən + gaŋgu/ [məŋgaŋgu] 'to disturb', /mən + hukum/ [məɲhukəm] 'to punish', /mən + aɟar/ [məɲaɟar] 'to teach' etc., and as [Ø] before sonorant consonants such as /mən + minta/ [məminta] 'to ask for', /mən + lihat/ [məliat] 'to see', /mən + wakil + i/ [məwakili] 'to represent' etc. (See a further discussion of this phenomenon in Section 5.5).

2.1.1.13 The underlying consonant /p/.

This underlying consonant may occur in morpheme initial and medial positions only. Its identity and distinctive function can be established by the following comparisons.

- (2.14) a. p/p: see (2.2:1) b. p/b: see (2.3:1)
 c. p/t: see (2.4:1) d. p/d: see (2.5:1)
 e. p/k: see (2.6:1) f. p/g: see (2.7:1)
 g. p/s: see (2.8:1) h. p/h: see (2.9:1)
 i. p/ç: see (2.10:1) j. p/ʃ: see (2.11:1)
 k. p/m: see (2.12:1) l. p/n: see (2.13:1)
 m. p/ŋ: /pəri/ [pəri] 'pain' - /ŋəri/ [ŋəri] 'shudder'
 n. p/l: /piur/ [piər] 'coconut' - /liur/[liər]'saliva'
 o. p/r: /pawa/ [pawa] 'soul' - /rawa/[rawa] 'swamp'

p. p/w: /hapa/ [hapa] 'only' - /hawa/ [hawa] 'air'

q. p/y: /apam/ [apam] 'weave' - /ayam/ [ayam] 'fowl'

The underlying consonant /p/ is phonetically realised as a voiced lamino alveolo-palatal nasal sound ([p]).

2.1.1.14 The underlying consonant /ŋ/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.15) a. ŋ/p: see (2.2:m) b. ŋ/b: see (2.3:m)
 c. ŋ/t: see (2.4:m) d. ŋ/d: see (2.5:m)
 e. ŋ/k: see (2.6:m) f. ŋ/h: see (2.7:m)
 g. ŋ/s: see (2.8:m) h. ŋ/h: see (2.9:m)
 i. ŋ/č: see (2.10:m) j. ŋ/ȝ: see (2.11:m)
 k. ŋ/m: see (2.12:m) l. ŋ/n: see (2.13:m)
 m. ŋ/p: see (2.14:m)
 n. ŋ/l: /tolon/[tolɔŋ] 'help' - /tolol/[tolɔl] 'stupid'
 o. ŋ/r: /haŋus/[haŋɔs] 'burnt' - /harus/[harɔs] 'must'
 p. ŋ/w: /taŋan/[taŋan] 'arms' - /tawan/[tawan] 'to capture'
 q. ŋ/y: /haŋat/[haŋat] 'warm' - /hayat/[hayat] 'life'

The underlying consonant /ŋ/ is phonetically realised as a voiced dorso velar nasal sound ([ŋ]).

2.1.1.15 The underlying consonant /l/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and

distinctive function can be established by the following comparisons.

- (2.16) a. l/p: see (2.2:n) b. l/b: see (2.3:n)
 c. l/t: see (2.4:n) d. l/d: see (2.5:n)
 e. l/k: see (2.6:n) f. l/g: see (2.7:n)
 g. l/s: see (2.8:n) h. l/h: see (2.9:n)
 i. l/ɕ: see (2.10:n) j. l/ʃ: see (2.11:n)
 k. l/m: see (2.12:n) l. l/n: see (2.13:n)
 m. l/p: see (2.14:n) n. l/ŋ: see (2.15:n)
 o. l/r: /tali/ [tali] 'rope' - /tari/ [tari] 'dance'
 p. l/w: /bala/ [bala] 'troop' - /bawa/[bawa] 'carry'
 q. l/y: /lalu/ [lalu] 'past' - /layu/ [layu] 'withered'

The underlying consonant /l/ is phonetically realised as a voiced alveolar frictionless lateral sound ([l]).

2.1.1.16 The underlying consonant /r/.

This underlying consonant may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.17) a. r/p: see (2.2:o) b. r/b: see (2.3:o)
 c. r/t: see (2.4:o) d. r/d: see (2.5:o)
 e. r/k: see (2.6:o) f. r/g: see (2.7:o)
 g. r/s: see (2.8:o) h. r/h: see (2.9:o)
 i. r/ɕ: see (2.10:o) j. r/ʃ: see (2.11:o)
 k. r/m: see (2.12:o) l. r/n: see (2.13:o)
 m. r/p: see (2.14:o) n. r/ŋ: see (2.15:o)
 o. r/l: see (2.16:o)

p. r/w: /merah/ [merah] 'red' - /mewah/ [mewah] 'luxurious'

q. r/y: /saraŋ/ [saraŋ] 'nest' - /sayan/ [sayan] 'to love'

The underlying consonant /r/ is basically realised on the phonetic level as a voiced apico alveolar trill ([r]). The underlying /r/ in the prefixes /bər/ ('stative/adjectival verb prefix'), /tər/ ('adverb/superlative forming prefix') and /pər/ ('causative forming prefix') is phonetically realised as [Ø] when the prefixes are added to stems beginning with /r/ such as /bər + rapat/ [bərapat] 'to have meeting', /tər + ramay/ [təramay] 'the most crowded (place)', /pər + rəndah/ [pərəndah] 'to lower' etc., or when they are added to a stem whose first syllable contains a schwa followed by a trill such as /bər + kərja/ [bəkərja] 'to work', /tər + pərčaya/ [təpərčaya] 'the most trusted person', /pər + tərnak + an/ [pətərnakan] 'ranch', etc. The underlying /r/ in the prefix /bər/ is phonetically realised as [l] (a voiced alveolar lateral consonant) when the prefix /bər/ is added to the item (stem) /aʃar/ 'to teach'. Thus the underlying form /bər + aʃar/ 'to study' (semantically is to teach oneself) is phonetically realised as [bəlaʃar]. This exceptional item has to be fully specified in the lexicon. (See a further discussion of this phenomenon in Section 5.1).

2.1.1.17 The underlying glides /w/ and /y/.

Both of these underlying glides may occur in morpheme initial, medial and final positions. We saw in the comparisons given above that each of them contrasts

with the sixteen underlying consonants discussed above. Therefore it is sufficient to oppose them to each other to show that each of them has different identity and distinctive function. These two glides are contrastive as shown by the pairs /rawa/ [rawa] 'swamp' vs /raya/ [raya] 'large', /bawaŋ/ [bawaŋ] 'onion' vs /bayaŋ/ [bayaŋ] 'shadow', /rantaw/ [rantaw] 'overseas' vs /rantay/ [rantay] 'chain' etc.

The underlying glide /w/ is phonetically realised as a voiced labio-velar glide ([w]). The underlying glide /y/ is phonetically realised as a voiced lamino palatal glide ([y] (=IPA [j])).

2.1.2 Loan Consonants.

As has already been indicated in Chart 1, there are four loan consonant sounds which have been introduced into the sound system of BI through loan words. They are, all fricatives, [f], [ʃ], [z], and [x]. Each of these sounds is usually in free variation with a certain 'native' sound in most loan words such as (2.18).

- (2.18) 1. pabrik [pabrɪʔ, fabrɪʔ] 'manufacture'
 hapal [hapal, hafal] 'to memorize'
 tarap [tarap, taraf] 'phase'
2. syah, sah [sah, ʃah] 'legal'
 asyik, asik [asiʔ, aʃɪʔ] 'absorbed'
 masyhur, mashur [maʃɔr, maʃɔr] 'famous'
3. zaman, jaman [ʃaman, saman, zaman] 'era, period'
 zat [sat, zat] 'substance'
 asas, azas [asas, azas] 'principle'

4. akhir, akir [akir, ahir, axir] 'end'
khabar, kabar [kabar, habar, xabar] 'news'
ikhlas, iklas [iklas, ihlas, ixlax] 'sincere'
5. wagon, wahon [wagən, wahən, waxən] 'wagon'
agen [agen, ahen, axen] 'agent, agency'
biologi [biologi, biolohi, bioloxi] 'Biology' etc.

From the above examples we see that [f] and [p], [ʃ] and [s], [z] and [ʒ] or [s], and [x] and [k] or [g] or [h] are in free variation in the speech community as a whole, and to some extent, in the speech of an individual speaker in the sense that he may use a loan sound with certain loan words but substitutes a native sound for the loan sound in other loan words. This phenomenon of free variability between a foreign and a native sound is not absolutely true in all cases. There are certain loan items, particularly items containing the labial fricative ([f]) recently borrowed whose foreign characteristics are preserved to some degree partly because they may be in conflict (i.e. they appear to form minimal pairs) with items that already exist (cf. 2.19) and partly because they are special vocabulary items used by educated people who happen to be familiar with the source language(s) (cf. 2.20).

- (2.19) 1.a. vak [f a k] 'school subject'
 b. pak [p a k] 'package'
- 2.a. fakta [fakta, pakta] 'facts'
 b. pakta [pakta] 'pact'
- 3.a. vas [f a s] 'vase'
 b. pas [p a s] 'precise, fit'

4. a. sarap, saraf [saraf, sarap] 'nerve'
b. sarap [sarap] 'garbage'
5. a. zeni [zeni, seni] '(army) engineers'
b. seni [səni] 'art'
6. a. zamzam [zamzam, ʃamʃam] 'holy water'
b. jam jam [ʃam ʃam] 'watches'
7. a. syarat [ʃarat, sarat] 'requirements'
b. sarat [sarat] '(fully) loaded'
8. a. khas [kas, kas, has] 'typical'
b. kas [kas] 'safe, money supply' etc.

Notice that each of the a-items in the above examples forms some sort of minimal pair with the b-items in the corresponding number. The existence of those pairs (although they may sometimes appear identical on the phonetic level) has been made the basis for recognizing the loan sounds as constituting different phonemes.

Notice, furthermore, that [f] in the following examples (2.20) is hardly ever to my knowledge replaced with [p].

(2.20) <u>fasilitas</u>	[fasilitas]	'facilities'
<u>federasi</u>	[fəderasi]	'federation'
<u>fakultas</u>	[fakultas]	'faculty'
<u>faktor</u>	[faktər]	'factor'
<u>fanatik</u>	[fanati?]	'fanatic'
<u>variasi</u>	[fariasi]	'variation'
<u>veto</u>	[feto]	'veto'
<u>visa</u>	[fisa]	'visa'
<u>vital</u>	[fital]	'vital'
<u>valuta</u>	[faluta]	'valuta' etc.

Examples (2.18) suggest that we do not need to postulate the loan consonants as underlying segments because we can always choose one of the naturalized (phonetic) forms as the underlying representation for each of those loan items and account for the foreign (phonetic) alternants by rules. This procedure, although it saves a few symbols, has some apparent disadvantages. Firstly, we cannot make a real general statement about the realisation of those loan items because some of the loan items require the obligatory application of phonetic realisation rules, some loan items require the optional application of certain realisation rules and some loan items do not require the application of certain realisation rules at all. For example, if we take /p/ as the underlying form of [f], then we need a phonetic realisation rule to convert the plosive into a fricative. This rule applies optionally to items like those given in (2.18:1; 2.19:2a, 4a), it applies obligatorily to items like those given in (2.20), but it does not apply at all to items like those given in (2.19:1b,2b,3b) although they are also loan items. Therefore we have to mark in the lexicon whether a certain loan item has to undergo, may or may not undergo a certain phonetic realisation rule.

Secondly, we will not always in such cases be able to have different underlying representations for different morphemes (cf. 2.19). Consequently, forms like those in (2.19) have to be indexed and marked along with

the indices whether they must, or may, or may not undergo a certain phonetic realisation rule. Obviously, this saving of symbols does not make the grammar simple. On the contrary, it complicates and obscures the lexicon.

Now we are left with the second alternative namely to postulate those loan consonants as underlying segments in addition to the eighteen consonants occurring in native BI items discussed in the previous subsection. The advantage of this procedure is obvious. We can then generalise the process of the substitution of the loan sounds without complicating and obscuring too much the lexicon part of the grammar.

The postulation of the four foreign sounds as underlying consonants has not however solved all problems concerning loan items. The fact that certain items may not undergo certain realisation rules (e.g. items like those given in (2.20) which are not liable to the rule that converts a labial fricative into the corresponding stop) makes it impossible to avoid the use of diacritic features. (see also Section 5.4).

2.2 Vowels

Most works dealing with the sound system of BI claim that there are six vowel phonemes in BI (see e.g. Alisjahbana, 1951:pp.12-15; Halim, 1974:pp.169-173; also Halim, 1972:p.154; Johns, 1975:pp.2-7; Kähler, 1956:p.34; Macdonald and Darjowidjojo, 1967:pp.21-30; Panitia Edjaan Lembaga Bahasa dan Kesusastraan 'The Spelling Committee of the Institute of Language and Literature', 1966:p.8;

Wolff, 1971:p.5 etc).⁶ The six vowel phonemes are usually represented by the symbols: / i, e, ə, a, u/ and /o/. These vowels can further be characterised in general phonetic terms by means of the following chart.

Chart 2

	Unrounded		Rounded
	Front	Central	Back
High	i		u
Mid	e	ə	o
Low		a	

The above six vowels are all postulated as underlying vowel segments in the present description. In the subsequent paragraphs we are going to examine the relationships between the underlying vowels with regard to each other (i.e. their distinctive relation) and between the underlying vowels and their respective phonetic realisations. Since the vowels /e/ and /ə/ never form minimal pairs (at least not within the range of native BI items) in which they can be contrasted, the

6. Halim (1974:p.169ff) reports that Samsuri (1960) and Dardjowidjojo (1966), who are both Javanese speakers, posit eight vowels for BI under the influence of Javanese which recognizes eight vowel phonemes, i.e. three front vowels (/i, I, e/), two central vowels (/ə, a/) and three back vowels (/u, o, ɔ/). It will be clear later that [I] and [ɔ] are respectively the nontense versions of /i/ and /o/ (See Section: 5.6).

discussion of these two underlying vowels will come last. The order of the discussion of the underlying vowels below has no significance whatsoever. It will be seen from the comparisons given below that /ə/ is never stressed. This means that items containing /ə/ will not constitute absolute minimal pairs with items containing other vowels. The facts that high vowels /i/ and /u/ may become non-syllabic (cf. Section 5.7) makes it necessary to contrast the high vowels with the corresponding glides /y/ and /w/ respectively.

2.2.1 The underlying vowel /i/.

This underlying vowel may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.21) a. i/a: /ikan/ [ikan] 'fish' - /akan/ [akan] 'will'
 i/u: /gila/ [gila] 'mad' - /gula/ [gula] 'sugar'
 i/o: /kita/ [kita] 'we (incl)- /kota/[kota] 'town,city'
 i/e: /bila/ [bila] 'when' - /bela/ [bela] 'defend'
 i/ə: /kira/ [kira] 'think' - /kəra/[kəra] 'monkey'
 i/y: /i a / [i a] 'he,she' - /ya/ [ya] 'yes'

The underlying vowel /i/ is basically realised as a voiced high front unrounded oral vowel ([i]) on the phonetic level. In final closed syllables (i.e. syllables ending in a consonant), the underlying vowel /i/ is phonetically realised as a nontense high front unrounded vowel ([ɪ]) (cf. Section 5.6). Sometimes the underlying

/i/ may also be realised phonetically as a voiced palatal glide ([y]) in certain environments such as /suria/ [suria, surya] 'the sun', /iuran/ [iuran, yuran] 'contribution (money)' etc (cf. Section 5.7).

2.2.2 The underlying vowel /a/.

This underlying vowel may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

(2.22) a. a/i: see (2.21:a)

b. a/u: /bata/ [bata] 'brick' - /batu/ [batu] 'stone'

c. a/o: /kata/ [kata] 'word' - /kota/ [kota] 'town, city'

d. a/e: /anak/ [ana?] 'child' - /enak/ [ena?] 'delicious'

e. a/ə: /saraŋ/ [saraŋ] 'nest' - /saraŋ/ [səraŋ] 'attack'

The underlying vowel /a/ is phonetically realised as a voiced central low unrounded oral vowel ([a]).

2.2.3 The underlying vowel /u/.

This underlying vowel may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

(2.23) a. u/i: see (2.21:b)

b. u/a: see (2.22:b)

c. u/o: /pula/ [pula] 'also' - /pola/ [pola] 'pattern'

d. u/e: /tunda/ [tunda] 'postpone' - /tenda/ [tenda] 'tent'

e. u/ə: /ulaŋ/ [ulaŋ] 'repeat' - /əlaŋ/ [əlaŋ] 'hawk'

- f. u/w: /kaul/ [kaʊl] 'promise' - /kawul/ [kawʊl] 'tinder'
etc.

The underlying /u/ is basically realised as a voiced high back rounded oral vowel ([u]) on the phonetic level. In a final closed syllable, the underlying /u/ is phonetically realised as [ʊ], a lax version of [u] (cf. Section 5.6). Sometimes the underlying /u/ is also realised as [w] in certain environments such as /uaŋ/ [uaŋ, waŋ] 'money', /kuitansi/ [kuitansi, kwitansi] 'receipt' etc. (cf. Section 5.7).

[uaŋ, waŋ] 'money', /kuitansi/ [kuitansi,

2.2.4 The underlying vowel /o/.

This underlying vowel may occur in morpheme initial, medial and final positions. Its identity and distinctive function can be established by the following comparisons.

- (2.24) a. o/i: see (2.21:c)
b. o/a: see (2.22:c)
c. o/u: see (2.23:c)
d. o/e: /bola/[bola] 'ball' - /bela/[bela] 'defend'
e. o/ə: /roda/[roda] 'wheel' - /rəda/[rəda] 'stop(rain)'

The underlying /o/ is basically realised as a voiced mid back rounded oral vowel ([o]) on the phonetic level. In a final closed syllable, the underlying /o/ is phonetically realised as [ɔ], a lax version of [o] (cf. Section 5.6).

2.2.5 The underlying vowels /e/ and /ə/.

The underlying vowel /e/ may occur in morpheme initial, medial and final positions. It is basically realised as a voiced mid front unrounded oral vowel ([e]) on the phonetic level. In a final closed syllable, the underlying /e/ is phonetically realised as [ɛ], a lax version of [e] (cf. Section 5.6). In word non-final unstressed positions, /e/ tends to be realised phonetically as [ə] (cf. Section 5.6).

The underlying vowel /ə/ may occur in morpheme initial and medial positions only in native BI (Malay) items. It is phonetically realised as a voiced central mid oral vowel ([ə]). Sometimes the underlying /ə/ is phonetically realised as [Ø] in certain environments such as /əmas/ [əmas, mas] 'gold', /karəna/ [karəna, karna] 'because' etc. (cf. Section 5.6).

The fact that /e/ can be realised as [ə] on the phonetic level requires some justification for the postulation of /ə/. Phonologically, /ə/ behaves differently from the other five vowels in some respects. Firstly, the schwa does not occur in morpheme final syllables except in a small number of recently borrowed items such as (2.25).

(2.25) ruwet (Javanese) [ruwət] 'complicated'

ganteng (Javanese) [gantəŋ] 'handsome'

banter (Javanese) [bantər] 'quick'

tante (Dutch) [tantə] 'aunt'

sistem (English/Dutch) [sistəm] 'system' etc.

Many speakers however tend to use [e] (or [ɛ] - the lax version of [e]) instead, partly because native Malay (BI)

items do not contain schwa in the final syllable and partly because many regional languages do not recognize the schwa at all.

Secondly, the schwa is usually unstressable while the other vowels are potentially stressable. In general, stress falls on the penultimate syllable of words. But when the vowel of the penultimate syllable is a schwa, the stress is shifted to the ultima in bisyllabic words and also in polysyllabic words when the syllables before the penult also contain [ə] as in (2.26:1), or to the ante penultimate syllable in polysyllabic words provided that the vowel of the ante penult is not a schwa as in (2.26:2) below. (See a further discussion of this phenomenon in Section 5.9).

- (2.26) 1. a. emas [əmás] 'gold' b. seteru [sətəru] 'enemy'
 terang [təráŋ] 'light' tentera [təntərə] 'soldier'
 sedih [sədih] 'sad' sedekah [sədəkāh] 'alm'
 beri [bəri] 'give' keledai [kələdáy] 'donkey'
 penuh [pənúh] 'full' selesai [sələsáy] 'finished'
2. ceritera [čərítəra, čərítra] 'story'
 putera [pútəra, pútra] 'son, boy'
 sutera [sútəra, sútra] 'silk'
 samudera [samúdəra, samúdra] 'ocean'
 mantera [mánəta, mántra] 'magic words' etc.

Notice that [ə] in examples (2.26:2) above can be deleted on the phonetic level. In fact, schwa tends to be deleted in casual speech (See a further discussion of this schwa deletion in Section 5.6).

A problem arises when we compare the phonological behaviour of [ə] with that of [e]. The front mid vowel ([e]) usually occurs only in the penult and ultima in polysyllabic items. The occurrence of [e] in syllables other than the penult or ultima in polysyllabic items (i.e. in unstressed position) is limited to a number of loan items such as (2.27).

- (2.27) Desember [desembɛr] 'December'
republik [republiˈk] 'republic'
demokrasi [demokrasi] 'democracy'
sertipikat [sertipikat] 'certificate' etc.

It must be noted however that many speakers tend to realise the unstressed mid front vowel in the above examples as [ə] on the phonetic level. This tendency is also observed in words derived from stems containing the front mid vowel as in (2.28).

- (2.28) 1. a. bebas [bébas] 'free'
 b. kebebasan [kəbəbásan] 'freedom'
 2. a. merdeka [mərdéka] 'independent'
 b. kemerdekaan [kəmərdəkáʔan] 'independence'
 3. a. desa [désa] 'village'
 b. pedesaan [pədəsáʔan] 'village areas' etc.

Note that the a items in the above examples are stems and the b-items are derivatives. Note, furthermore, that stress in the above derivatives is shifted with respect to the stress assigned to the stems.

Up to this point we might wish to regard the schwa ([ə]) simply as an allophonic realisation of /e/ because its distribution seems to be phonologically definable

i.e. it occurs in a non-final unstressed position, an environment where [e] does not occur. (Items cited in (2.25) and (2.27) can be accounted for by assigning the diacritic feature loan in the lexicon). This kind of solution apparently introduces a new problem. Unless a constraint or a set of constraints exist which show that the two vowel sounds ([e] and [ə]) are mutually exclusive in terms of vowels that may precede or follow each of them, stress must be held responsible for the distribution of those vowels. In other words, stress has to be regarded as having distinctive function in the sense that it is lexically idiosyncratic and therefore unpredictable. Examples (2.29) below may succinctly demonstrate that by and large stress is predictable in BI. In general, one can say that stress in BI falls on the penultimate syllable of words. This is clearly shown by items b and c below.

- (2.29) 1. a. bodoh [b ó d o h] 'stupid'
 b. kebodohan [kəbodóhan] 'stupidity'
 c. kebodohanmu [kəbodohánmu] 'your stupidity'
2. a. pendek [p é n d ɛ ?] 'short'
 b. memendekkan [məməndékan] 'to shorten'
 c. memendekkannya [məməndəkánna] 'to shorten it'
3. a. bela [b é l a] 'to defend'
 b. pembelaan [pəmbəláʔan] 'defence, act of defending'
 c. pembelaanku [pəmbəlaʔánku] 'my defence'

4. a. terang [tə r á ŋ] 'light, bright'
 b. diterangkan [ditə r á ŋ kan] 'to be explained'
 c. diterangkannya [ditə r á ŋ k á n n a] 'to be explained by
 him'
5. a. beri [b ə r í] 'to give'
 b. pemberian [pə m b ə r í an] 'gift'
 c. pemberianmu [pə m b ə r í an mu] 'your gift'
6. a. ceritera [çə r í t ə r a] 'story'
 b. ceriterakan [çə r í t ə r á kan] 'to tell a story'
 c. diceriterakannya [di çə r í t ə r á k á n n a] 'it was told by
 him'

Although the penultimate syllable of the last three stems (2.29:4a,5a,6a) is not stressed, the placement of stress in words derived from the stems (cf. 2.29:4b,c;5b,c;6b,c) is on the penultimate syllable of the derivatives.

Therefore, there are good reasons for not regarding stress as a phoneme in BI. This means that the distributions of [e] and [ə] cannot be regarded as being conditioned by stress, but rather the other way round.⁷

7. The fact that stressed vowels are relatively longer compared with unstressed vowels might make us postulate an additional vowel in the underlying representation of items which are stressed on the final syllable on the phonetic level by doubling the stressed vowel. For example, the items terang [tə r á ŋ] 'light', beri [b ə r í] 'to give' etc (cf. 2.29:4a,5a) will have the underlying forms /tə r á a ŋ/ and /b ə r í i/ respectively. This would then account for the occurrence of [ə] rather than [e] in the first syllable of the items (assuming that they are both the alternants of /e/) because the stress could be viewed as occurring on the penult rather than on the ultima. To yield the correct phonetic forms of those items we would need a rule that would convert the two-identical vowel sequences into single vowels. This sort of rule does not seem to be phonologically motivated. As we shall see later, a sequence of two identical vowels is usually broken up by a glottal stop insertion rather than by degemination.

In order to justify the interpretation of schwa as the allophone of /e/, we must therefore rely on the existence of a constraint or a set of constraints (i.e. morpheme structure conditions) which can be held responsible for the distributions of these vowels ([e] and [ə]). It has been pointed out earlier that [e] and [ə] are mutually exclusive in morpheme final syllable, and to a degree in morpheme initial and medial syllables (syllables other than the penult) in polysyllabic items. In the penultimate syllable, the two vowels ([e] and [ə]) are also in complementary distribution in certain environments in indigenous items. The vowel [e] may occur in the penultimate syllable when the ultima contains a mid vowel as in (2.30:1), and the vowel [ə] when the ultima contains a high vowel as in (2.30:2).

- (2.30) 1. besok [besɔʔ] 'tomorrow' pendek [pendɛʔ] 'short'
 belok [belɔʔ] 'tu turn' benteng [bentɛŋ] 'fort'
 elok [elɔʔ] 'nice' leher [lehɛr] 'neck'
 tempo [tempo] 'time' nenek [nenɛʔ] 'grand mother'
 2. belum [bəlɔm] 'not yet' sedih [sədih] 'sad'
 terus [tərɔs] 'continue' penting [pɛntɪŋ] 'important'
 seteru [sətəru] 'enemy' lebih [ləbih] 'more'
 cenderung [ɕəndərɔŋ] 'tend' sering [sərɪŋ] 'often' etc.

However, both vowels ([e] and [ə]) may occur in the penultimate syllable when the ultima contains a low vowel ([a]) such as (2.31).

- (2.31) a. bela [bela] 'defend' b. belah [bəlah] 'cut length-wise'

rela [rela] 'willing' reda [rəda] 'stop(rain)'
enak [enaʔ] 'delicious' enam [ənam] 'six'
bendera [bəndera] 'flag' setelah[sətəlah]'after' etc.

Without taking into account minimal pairs which exist through borrowing, such as pening [pəniŋ] 'dizzy'(BI) vs pening [peniŋ] 'animal licence batch' (Dutch), teras [təras] 'pith' (BI) vs teras [teras] 'terrace' (Dutch/English) etc., examples (2.31) above succinctly show that the two vowels ([e] and [ə]) have to be postulated as two different underlying vowels in the phonological representation.

2.3 The Characterisation of Segments in Terms of Distinctive Features

In generative phonology, the description on the phonological and phonetic levels as well as the rules that convert phonological representations into phonetic representations are in terms of distinctive features. The distinctive features are "the minimal elements of which phonetic, lexical, and phonological transcriptions are composed, by combination and concatenation" (Chomsky and Halle, 1968:p.64). Thus the fundamental unit of a phonological description is the distinctive feature. The phoneme (defined as a bundle of distinctive features) has no independent linguistic status (see e.g. Chomsky, 1967: p.69; Fischer-Jorgensen, 1975:p.218 etc). The alphabetic symbols which are used to represent sound segments (phonemes or allophones) are regarded as nothing more than practical ad hoc abbreviations for feature bundles (cf. Chomsky and Halle, 1968:p.64; Halle, 1964:p.336 etc).

Halle (1964:pp.335-38) has convincingly shown that rules are frequently formulated much better in terms of distinctive features to the extent that general rules can be expressed more simply than less general rules. This is not the case with rules formulated in terms of alphabetic symbols. The problem is to select an appropriate set of features from the currently available features which will be capable of describing the systematic phonetics, of differentiating lexical items, and of defining natural classes, that is, those segments which as a group undergo similar phonological processes.⁸

In the present description, the features chosen are basically from those proposed by Chomsky and Halle (1968). They propose twenty two features which they claim to be universal and can be used as a framework for describing sound segments of any language. For BI only thirteen features are used to characterise the sound segments discussed in the last two sections. The thirteen features consist of (1) three major class features (consonantal, syllabic, sonorant), (2) seven cavity features (coronal, anterior, high, low, back, round, nasal), (3) two manner of articulation features (continuant, tense), and (4) one source feature (voice). Of the thirteen features, only twelve have classificatory function. One feature (i.e. tense) is relevant only to the description (representation) on the phonetic level.

8. Cf Schane, 1973:pp.25,35.

The feature system described in The Sound Pattern of English has been criticized on various points and therefore it cannot be regarded as definitive (see e.g. Ladefoged, 1971, Fant, 1973 etc). In the present description, the segments [h] and [ʔ] are classified, following Ladefoged (1971), as non-sonorant glides ([-Consonant, -Syllabic, -Sonorant]). (Note that Chomsky and Halle treated these two segments as sonorant glides). The feature syllabic, described by Chomsky and Halle (1968:p.354) as a feature "which would characterize all segments constituting a syllable peak", is used here in place of the feature vocalic of their feature system.

The feature continuant in Chomsky and Halle's feature system divides sounds into two groups on the basis of the blockage of air flow in the vowel tract. They write "In the production of continuant sounds, the primary constriction in the vowel tract is not narrowed to the point where the air flow past the constriction is blocked; in stops the air flow through the mouth is effectively blocked." According to this definition, liquids (lateral and trill) are continuant sounds because the air flow through the mouth is not effectively blocked in the production of the sounds. To keep them apart one needs the feature laterality. From the simplicity point of view, this laterality feature is too costly for the phonology of BI because it has no purpose other than to keep /l/ and /r/ distinct. For this reason, the trill

liquid (/r/) is classified, following Jakobson, Fant and Halle (1952), as a non-continuant (or interrupted) consonant.⁹ The classification of segments in terms of other features is essentially based on the definitions given by Chomsky and Halle (1968:pp.302-329).

Table 1 below shows the distinctive feature composition of BI segments. The table (or matrix) indicates which set of feature values the alphabetic symbols used in the informal representation may be referred to. Features which are not relevant to certain segments are left blank. Notice that the feature tense and segments [ʔ], [ɪ], [ɛ], [ɔ] and [ɔ̃] are enclosed between brackets to indicate that they have no classificatory function and therefore they are not relevant to the description on the phonological level.

Table: 1.

	p	b	m	t	d	n	r	l	s	ʃ	ç	ʝ	k	g	ŋ	h(?)
Consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sonorant	-	-	+	-	-	+	+	+	-	+	-	-	-	-	+	-
Coronal	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-
Anterior	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-
High	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-
Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Back	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
Round																
Nasal	-	-	+	-	-	+	-	-	-	+	-	-	-	-	+	-
Continuant	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-
Voice	-	+	+	-	+	+	+	+	-	+	-	+	-	+	+	-
(Tense)																

9. In Jakobson and Halle (1956:pp.41-2) the binary opposition interrupted vs continuant is replaced by abrupt vs continuant.

Table: 1 (continued)

	y	w	f	z	ʃ	x	ɪ	(ɪ)	e	(ɛ)	ə	a	u	(ʊ)	o	(ɔ)
Consonantal	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-
Syllabic	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+
Sonorant	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+
Coronal	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Anterior	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
High	+	+	-	-	+	+	+	+	-	-	-	-	+	+	-	-
Low	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Back	-	+	-	-	-	+	-	-	-	-	+	+	+	+	+	+
Round	-	+					-	-	-	-	-	-	+	+	+	+
Nasal	-	-	-	-	-	-										
Continuant	+	+	+	+	+	+										
Voice	+	+	-	+	-	-	+	+	+	+	+	+	+	+	+	+
(Tense)							+	-	+	-	-	-	+	-	+	-

Note that in the above table, affricates and plosives are not differentiated in terms of a major class feature. In Chomsky-Halle system, these two sound classes are distinguished by release features. Affricates are [+Delayed release] and plosives are [-Delayed release]. Since in BI affricates (/tʃ/ and /dʒ/) are both palatal and plosives are all non-palatal sounds, the place features coronal, anterior and back are enough to keep the two sound classes distinct.

CHAPTER 3

POSITIVE CONDITIONS

The concept of 'Positive Conditions' within a generative phonology framework was first suggested by Stanley (1967), who introduced the idea (along with the ideas of 'If-Then Conditions' and 'Negative Conditions') to express the canonical shapes of underlying forms of morphemes. In their description of the phonology of Akan, Schachter and Fromkin (1968) state general constraints on the syllable structure of Akan in terms of 'Positive Conditions' (cf. Hyman, 1975:pp.110-112; Brown, 1972:p.55 etc). Brown (1972) in her description of the phonology of Lumasaaba uses 'Positive Conditions' to state sequential constraints on the sequence of phonological elements (consonants and vowels) within phonological words and lexical entries, and on the sequence of segments in the phonetic realisation within a phonological tone.

In the present description, 'Positive Conditions' are used to capture the canonical shapes of underlying forms of morphemes (embodying possible morphemes) in BI. The canonical shapes render information about the general constraints on the sequence of segments (consonant and vowels) in the phonological representation of words and lexical entries. To some degree, the general constraints also hold true in the phonetic realisation within phonological words.¹ By a 'phonological word' is meant

1. Consonant clusters may occur in word-initial position on the phonetic level but not on the phonological level.

the maximum unit within which assimilation and syllabification processes may occur. In many instances, phonological words are coextensive with grammatical words, i.e. units or forms resulting from combining stem morphemes (lexical formatives) with affix morphemes (grammatical formatives). The notion of 'phonological word' may be somewhat uneasily related to the traditional definition of the term 'word' which tends to rest on criteria such as 'isolability', 'uninterruptability', 'cohesiveness' etc.²

Words (in the sense of combinations of morphemes) in BI are constructed by means of affixation and/or reduplication. There are however morphemes that never take any affixes or undergo reduplication, such as dengan [dəŋan] 'with', ketika [kətika] 'when', di [di] 'at,in,on', ke [kə] 'to', dan [dan] 'and' etc. As far as their structural patterns are concerned, they are similar either to those of stem morphemes or to those of affix morphemes. Thus the canonical forms of words (i.e. morpheme combinations) and lexical entries can also be captured by stating the canonical shapes of stem and affix morphemes.

This chapter consists of four sections. The first section deals with positive conditions that express permitted sequences of phonological segments within lexical stems. The second section deals with positive conditions

2. Cf. Lyons, 1968:pp.199;205; also Matthews, 1974:pp.20-24 and the references cited therein; Brown, 1972:p.31 etc.

that express permitted sequences of phonological segments within affixes. The third section presents examples of underlying forms of typical words, i.e. words constructed by means of affixation and/or reduplication. The fourth section presents the analysis of typical nouns which are accounted for in an ad hoc way in earlier studies on BI.

In stating permitted sequences of phonological segments within morphemes or words, the following symbols will be used.

- + formative boundary, ++ word boundary
- C [-Syllabic] (i.e. consonants and glides)
- V [+Syllabic] (i.e. vowels)

3.1 Lexical Stems

Hartmann and Stork (1972:p.219) define the term stem as "That which is left of a word when all inflexional -- affixes have been removed. ... The stem of a word is the form usually listed in dictionaries." A stem which is ultimately irreducible is called a lexical stem or root (see Matthews, 1974:pp.40,73). A lexical stem consists of one morpheme only; hence the term simple stem is often used to refer to a lexical stem as opposed to a complex stem (i.e. a stem which consists of one root and one or more affixes) or a compound stem (i.e. a stem which consists of, at least, two roots).

Note that intersecting parentheses in the following formula are used to indicate that at least one

of the items (elements) between the parentheses is obligatory. And if a morpheme is greater in length than that characterized in the sequential statement, the conditions within bracket R must reapply.

The canonical shapes of lexical stems in BI can be formulated as follows.

$$++ (C \text{ } \chi \text{ } V (C(C))) V (C^R ((C)V(C))^R) ++$$

This formula states that:

- (a) a lexical stem consists minimally of CV or VV
- (b) the maximum sequence of C is CC, and this CC sequence may occur only in medial position
- (c) the maximum sequence of V is VV
- (d) the lexical stem (if polysyllabic) may begin with CV, CVV, CVCV, CVCCV, VV, VCV, or VCCV
- (e) a lexical stem may end either in C or V

Theoretically, there are forty two different types of morpheme structure that can be derived from the above formula without reapplying conditions within bracket R. However, the corpus (cf. Section 1.3), being limited in nature, fails to contain items that exemplify all the forty two possible morpheme structures. The unexemplified structures are either peripheral (i.e. having a very low frequency of occurrences in actual morphemes), or are simply conceivable morpheme structures in that they conform to the general constraints enumerated above without any actual items existing in the language which exemplify them. This is particularly true with polysyllabic structures (i.e. structures which contain

three or more V's each) which have two consonant clusters. They are exemplified only by loan items such as industri /industəri/ [industri] 'industry' (Dutch/English), intensif /intənsif/ [intənsif, intənsɪp] 'intensive' (Dutch/English), sembahyang /səmbahyaŋ/ [səmbahyaŋ] 'to say a prayer' (Arabic) etc. whose structures are VCCVCCVCV, VCCVCCVC and CVCCVCCVC respectively. Lexical stems with the monosyllabic structures CV and CVC also belong to the peripheral type. The structure CV for instance, is exemplified only by one lexical stem to my knowledge, viz. /yu/ [yu] 'shark'. This item may take certain affixes like /lah/ 'emphatic suffix', /kah/ 'interrogative suffix', /bər/ 'adjectiviser prefix' etc. In addition, the item, being a noun, can be pluralized by reduplicating it.

It is generally agreed by scholars of Austronesian linguistics that the majority of lexical stems in Austronesian languages (thus, also in BI) are bisyllabic (i.e. containing two V's each).³ This claim is supported by the data. A sample of 202 stems of 256 words (i.e. units or forms consisting of lexical stems plus affixes and/or reduplication) found in the data (cf. Section 1.3) shows that 189 items (93.1 per cent) are bisyllabic, and of the remaining 13 items, 12 items (6.4 per cent) are trisyllabic, and one item (0.5 per cent) is monosyllabic. Structurally, the 189 items can be grouped into 11 types,

3. See e.g. Halim, 1974:p.181ff and the references cited therein.

and the 12 trisyllabic items into five types. The distribution of the 189 items over the 11 types of structure shows a considerable range of dispersal. The structure CVCVC for example is exemplified by 90 items (lexical stems), while the structure VV is exemplified only by one lexical stem, viz. /i a/ [i a] 'he,she'. (As a matter of fact, this is the only morpheme in BI that I am aware of having the structure VV). This in short, within the bisyllabic group itself there is a wide range of frequency of occurrences or use of structures in the language.

It must be noted however that the 17 types of structure (1 monosyllabic, 11 bisyllabic and 5 trisyllabic) which appear in the 202 stems of the 256 sample words mentioned above do not necessarily imply that they are all more common than those which happen not to be exemplified in the sample. Nor does the number of

items exemplifying each of those structures necessarily correspond to the proportion of actual morphemes in BI. The structures VV and CVC for example, are exemplified by one lexical stem each, viz. /ia/ [i a] 'he,she' and /zam/ [zam, sam, ʃam] (a bound root appearing in the form zamzam 'holy water (from Mecca's sacred well)'). The structure CVC however has a higher frequency of occurrences than the structure VV does. In the data (cf. Section 1.3) there are nine more items of the CVC structure which may take affixes and/or undergo reduplication. They are (1) /šah/ [sah, šah] 'legal' (e.g. /mən+šah+kan/

[məŋəsahkan, məŋsahkan] 'to legalize'), (2) /hak/ [hak, ha?] (e.g. /bər+hak/ [bərhak, bərha?] 'to have right'), (3) /bak/ [bak] 'trough' (e.g. /bak+pa/ [bakpa] 'the trough'), (4) /rak/ [rak,ra?] 'shelf' (e.g. /rak+rak/ [rakrak, ra?ra?] 'shelves'), (5) /pak/ [pak] 'package' (e.g. /di+pak/ [dipak] 'to be packed'), (6) /tik/ [tik] 'to type' (e.g. /mən+tik/ [məŋətik] 'to do typing'), (7) /teh/ [teh] 'tea' (e.g. /teh+mu/ [tehmu] 'your tea'), (8) /jam/ [jam] 'watch' (e.g. /bər+jam/ [bərjam] 'to wear a (wrist) watch') and (9) /zat/ [zat, sat, jat] 'substance' (e.g. /zat+pa/ [zatpa, satpa, jatpa] 'its substance').

Finally, it is necessary to point out that the conditions enumerated above, especially the conditions on consonant sequences hold true mainly within native BI items. There are quite a number of recently borrowed items (lexical stems) which do not meet the conditions enumerated above in the sense that none of their phonetic alternants conform to those conditions. Some of the loan items contain consonant clusters occurring in morpheme-initial position such as klinik [klinik] 'clinic' (Dutch/English), praktek [prakték] 'practice' (English/Dutch), transpor [transpɔr] 'transport' (English/Dutch) etc., and some contain sequences of three or more consonants such as struktur [struktuɔr] 'structure' (English/Dutch), instruksi [instruksi] 'instruction' (Dutch/English), inspektur [inspektuɔr] 'inspector' (Dutch/English) etc. These items have to be represented in such a way on the phonological level so that they conform to the general

conditions enumerated above. Inadmissible sequences (consonant clusters) will be broken up by inserting a schwa. Thus clusters in morpheme-initial position will be broken up by inserting a schwa immediately after the first consonant, and consonant clusters containing three or four consonants in morpheme-medial position will be broken up by inserting a schwa between the second and the third consonants. Accordingly, the loan items cited above will be phonologically represented as (3.1) below.

(3.1) klinik: /kəlinik/ [klinɪk] 'clinic'

praktek: /pəraʔtek/ [praktɛk] 'practice'

struktur: /səʔstruktur/ [struktʊr] 'structure'

instruksi: /insəʔtruksi/ [instruksi] 'instruction'

inspektur: /insəʔpektur/ [inspektʊr] 'inspector'

(See a further discussion of these loan words in Section 5.6).

3.2 Affixes

The canonical shapes of affixes in BI can be formulated as follows.

+ (C)V(C(V)) +

The formula states that:

- (a) an affix consists minimally of V and maximally of CVCV
- (b) the maximum sequence of C is C
- (c) the maximum sequence of V is V
- (d) an affix may end either in C or V

BI makes use of twenty three (phonological) affixes for inflectional and derivational purposes. The function and meaning of an affix depend largely upon the stem to

which it is attached. Take for instance the prefix /bər-/. With verb stems, the prefix /bər-/ is inflectional (i.e. it simply marks the syntactical function of the stems without changing the grammatical class or category of the stems) denoting intransitive verbs as in (3.2); with noun stems, it is derivational (i.e. it changes the grammatical class of the stems from noun into verb or adjective) whose meaning may differ from stem to stem as in examples (3.3) below.

(3.2) /bər-/ + VERB STEM

- /bər + papi / [bərpapi] 'to sing' (intransitive)
- /bər + tənkar/ [bərtənkar] 'to quarrel'
- /bər + kəlahi/ [bərkəlai] 'to be involved in a fight'
- /bər + dandan/ [bərdandan] 'to make up oneself'
- /bər + səmbupi / [bərsəmbupi] 'to hide (oneself)' etc.

The corresponding transitive forms of those verbs are, respectively, /məntəpapi+kan/ [mənapikan] 'to sing a song', /məntəpərtənkar+kan/ [məmpərtənkar+kan] 'to quarrel (upon)', /məntəpərkəlahi+kan/ [məmpərkəlaikan] 'to fight (on something)', /məntədandan+i/ [məndandani] 'to beautify', /məntəsəmbupi+kan/ [məpəmbupikan] 'to hide (something)'.

(3.3) /bər-/ + NOUN STEM

- /bər + səpeda / [bərsəpeda] 'to go by bicycle'
- /bər + foto / [bərfoto] 'to have one's picture taken'
- /bər + lumpur/ [bərlumpər] 'to be muddy'
- /bər + air / [bərar] 'to be watery'
- /bər + kata / [bərkata] 'to say words' etc.

Table: 2

No.	Structure	Prefix	Suffix	Infix	Total
1.	CV	di, kə, ku pə, sə	ku, mu, pa		8
2.	CVC	bər, mən pər, tər	kah, kan, lah pun, wan		9
3.	CVCV		wati		1
4.	V		i		1
5.	VC		an	əl, əm, ər	4
Total		9	11	3	23

It must be pointed out however that some of the forms (affixes) listed in Table 2 above represent two or more morphemes each. The form /lah/ for example can be an 'emphatic suffix' as in /kamu+lah makan/ [kamúlah makan] 'You who should eat', or a 'mild imperative forming suffix' as in /kamu makan+lah/ [kamu makánlah] '(You) eat please' etc. It must also be pointed out, furthermore, that the forms given in Table 2 above are phonological (underlying) forms of affixes (morphemes) and therefore preclude allomorphs.

As to the operative function of these affixes, one can state briefly that they differ in their productivity. Some affixes such as /mən/ 'active voice verb prefix', /di/ 'passive voice verb prefix', /bər/ 'intransitive/stative verb forming prefix', /kan/ 'transitive verb forming suffix', /i/ 'transitive verb forming

suffix'⁴ etc. are capable of combining with a large number of items, and some can combine only with a handful of items. The cases in point are /wan/ 'male human noun forming suffix', /watɪ/ 'female human noun forming suffix' and the infixes - /-əl-/, /-əm-/ and /-ər-/. Note that these infixes are no longer used productively in contemporary BI. The occurrence of these infixes in modern BI is limited to a number of long-established items or phrases such as telunjuk [təlunʃəʔ] 'forefinger' (←-- /-əl-/ + /tunʃuk/ [tunʃəʔ] 'to point'), gemuruh [gəmuruh] 'thundering' (←-- /-əm-/ + /guruh/ [guruh] 'thunder'), terali [tərali] 'lattice' (←-- /-ər-/ + /tali/ [tali] 'rope'), kemuning [kəmunɪŋ] 'yellow' (←-- /-əm-/ + kunɪŋ/ [kunɪŋ] 'yellow'), kelelawar [kələlawar] 'bat' (←-- /-əl-/ + /kəlawar/ [kəlawar] 'bat') etc. Although these infixes can still be identified in a number of long-established words and phrases, they show no clear pattern of meaning and function. It is therefore justifiable to treat the forms consisting of lexical stems and infixes cited above and the like as 'lexicalized' items. (See also Tables 4a-c for further information on the productivity of these affixes).

3.3. Examples of Underlying Forms of Typical Words

It has been stated above for the purpose of the present description that a 'phonological word' is

4. The suffix /kan/ is different syntactically from the suffix /i/ in that /kan/ may have an indirect object while /i/ can only have a direct object.

the maximum unit within which assimilation and syllabification processes may occur. A phonological word may further be characterized by stress placement which, generally, occurs on the penultimate syllable of the word. This section, while exemplifying a number of (underlying) structures of lexical stems captured by the formula set up in Section 3.1, presents examples of underlying forms of typical phonological words, that is words which structurally consist of stems plus affixes and/or duplication of stems.

It has been pointed out in Section 3.1 that in the data there are 256 phonological words constructed out of 202 lexical stems. It has also been stated that the 202 lexical stems exemplify 17 different types of structure. Let us examine the distribution of the 202 lexical stems over the 17 types of structure. Lexical stems in the following examples are underlined.

a) 90 stems are of the structure CVCVC ([-Syll,+Syll,-Syll,+Syll,-Syll]) as in (3.5)

(3.5) 1. /bodoh + i/[bodohi, bodoi] 'to outwit, to make fool'

2. /titel + na/[titelpa] 'his/her/its title'

3. /kə + bebas + an/[kəbebasan, kəbəbasan] 'freedom'

4. /mən + ramay + kan/[məramaykan] 'to celebrate'

5. /pə + mən + didik + an/[pəndidikan] 'education' etc.

b) 39 stems are of the structure CVCV ([-Syll,+Syll,-Syll,+Syll]) as in (3.6) below.

- (3.6) 1. /duri + an/ [durian] 'a thorny fruit'
 2. /mən + gula + i/ [məŋgulai] 'to sugar'
 3. /mən + təmu + kan/ [məməmukan] 'to discover'
 4. /pə + desa + an/ [pədəsaʔan, pədəsaʔan] 'village
 area'
 5. /pə + mən + tari/ [pənari] 'dancer' etc.

c) 17 stems are of the structure CVCCVC ([-Syll,+Syll,-Syll,-Syll,+Syll,-Syll]) as in (3.7) below.

- (3.7) 1. /sə + bərsih / [səbərsih] 'as clean (as)'
 2. /tər + panday/ [tərᵛpanday] 'the cleverest'
 3. /mən + pindah + kan/ [məmindahkan] 'to remove'
 4. /kə + banjir + an/ [kəbaŋʃiran] 'to be flooded'
 5. /di + pər + tupjuk + kan/ [dipərtupjukan] 'to be
 shown'

d) 13 stems are of the structure CVVC ([-Syll,+Syll,+Syll,-Syll]) as in (3.8) below.

- (3.8) 1. /sə + Luas/ [səluas] 'as big as'
 2. /buat + an/ [buatan] 'product, trade mark'
 3. /kə + baik + an/ [kəbaikan] 'kindness'
 4. /mən + pər + baik + i/ [məmpərbaiki] 'to repair'
 5. /pə + mən + muay + an/ [pəmuayan] 'expansion' etc.

e) 8 stems are of the structure VCCVC ([+Syll,-Syll,-Syll,+Syll,-Syll]) as in (3.9) below.

- (3.9) 1. /anguk + an/ [angukan] 'nod'
 2. /bər + empat/ [bərempat] 'in (by) four'
 3. /di+ambil+na/ [diambilna] 'taken by him/her'
 4. /kə+indah+an/ [kəindahan] 'beauty'
 5. /undang+undang/ [undang undang] 'law, regulation' etc.

f) 7 stems are of the structure VCVC ([+Syll,-Syll,+Syll,-Syll]) as in (3.10) below.

- (3.10) 1. /məntəajər/ [mənəjər] 'to teach'
 2. /ədik+mu/ [adikmu] 'your (younger) brother/
 sister'
 3. /tət+rɪŋat/ [təriŋat] 'to remember (incidentally)'
 4. /sət+orən/ [səorən] 'a person'
 5. /axir+nə/ [axirnə, ahirnə, akirnə] 'the end,
 at last'

g) 6 stems are of the structure CVCCV ([-Syll,+Syll,-Syll,
-Syll,+Syll]) as in (3.11) below.

- (3.11) 1. /mən+gangu/ [məŋgangu] 'to disturb'
 2. /bər+hənti/ [bərhənti] 'to stop'
 3. /di+tərka/ [ditərka] 'to be guessed'
 4. /bər+kərjə/ [bəkərjə] 'to work'
 5. /di+sərtati/ [disərtai] 'to be accompanied' etc.

h) 5 stems are of the structure VCV ([+Syll,-Syll,+Syll]):

- (3.12) 1. /mən+isi/ [məɲisi] 'to fill'
 2. /ada+lah/ [adalah] 'that/it is'
 3. /ibu+pa/ [ibupa] 'his/her mother'
 4. /apa+kah/ [apakah] 'is it, what'
 5. /aku+pun/ [akupən] 'I too'

i) 5 stems are of the structure CVVCV ([-Syll,+Syll,+Syll,-Syll,+Syll]).

- (3.13) 1. /suami+pa/ [suami^hpa] 'her husband'
 2. /suarat+pa/ [suarat^hpa] 'her/his voice'
 3. /sə+suatu/ [səsuat^hu] 'something'
 4. /siapa+kah/ [siapakah] 'who'
 5. /biasa+pa/ [biasap^ha] 'usually'

j) 3 stems are of the structure VCVCVCV ([-Syll,+Syll,-Syll,-Syll,+Syll,-Syll,+Syll]) - see (3.14:1), 2 stems are of the structure VCCVCV ([+Syll,-Syll,-Syll,+Syll,-Syll,+Syll]) - see (3.14:2), 2 stems are of the structure CVCVCV ([-Syll,+Syll,-Syll,+Syll,-Syll,+Syll]) - see (3.14:3), 1 stem is of the structure VV ([+Syll,+Syll]) - see (3.14:4), 1 stem is of the structure VVC ([+Syll,+Syll,-Syll]) - see (3.14:5), 1 stem is of the structure VCCV ([+Syll,-Syll,-Syll,+Syll]) - see (3.14:6), 1 stem is of the structure CVCVCVC ([-Syll,+Syll,-Syll,+Syll,-Syll,+Syll,-Syll]) - see (3.14:7), and 1 stem is of the structure CVC ([-Syll,+Syll,-Syll]) - see (3.14:8).

- (3.14) 1. a. /səndiri+an/ [səndiriːn] 'alone'
 b. /kə+mərdeka+an/ [kəmərdekaʔan] 'independence'
 c. /tərtawa+kan/ [tərtawakan] 'to laugh at'
 2. a. /istəri+na/ [istəriːna] 'his wife'
 b. /antara+na/ [antarana] 'among others'
 3. a. /bər+kəlahi/ [bəkəlai, bəkəlahi] 'to fight'
 b. /bərapa+kah/ [bərapakah] 'how many/much'
 4. /i a+lah/ [ialah] 'he/she/it is'
 5. /air+na/ [airna] 'the water'
 6. /bər+arti/ [bərti] 'to mean, meaningful'
 7. /negatif+na/ [negatifna, negatipna] 'the
 (film) negative'
 8. /zam+zam/ [zamzam, samsam, ʃamʃam] 'holy water'

The structures of the 202 lexical stems presented above can be summarized as follows.

Table: 3

Structure	Number of items	Percentage	Reference to Examples
<u>Monosyllabic:</u>			
1. CVC	1	0.5	(3.14:8)
<u>Bisyllabic:</u>			
2. CVCVC	90	44	(3.5)
3. CVCV	39	19.3	(3.6)
4. CVCCVC	17	8.4	(3.7)
5. CVVC	13	6.4	(3.8)
6. VCCVC	9	4.4	(3.9)
7. VCVC	7	3.5	(3.10)
8. CVCCV	6	3	(3.11)
9. VCV	5	2.5	(3.12)
10. VV	1	0.5	(3.14:4)
11. VVC	1	0.5	(3.14:5)
12. VCCV	1	0.5	(3.14:6)
<u>Trisyllabic:</u>			
13. CVVCV	5	2.5	(3.13)
14. CVCCVCV	3	1.5	(3.14:1)
15. VCCVCV	2	1	(3.14:2)
16. CVCVCV	2	1	(3.14:3)
17. CVCVCVC	1	0.5	(3.14:7)

The central point in this section so far has been to exemplify the underlying structures of the 202 lexical stems which, by virtue of affixation and/or reduplication, make up 256 phonological words. The increase in the number of words compared with the number of lexical stems indicates that certain lexical stems take different affixed and/or undergo reduplication.

The following tables (4a,4b,4c) show the occurrence of affixes and/or reduplication in the 256 phonological words. Note that the numbering of affixes of the same type occurring in succession is from left to right. Thus the prefixed /mən-/ and /pər-/, and the suffixes /-kan/ and /-pa/ in the word mempertimbangannya /mən+pər+timbang+kan+pa/ [məmpərtimbangannya] 'to consider it' for example, are identified as Prefix 1, Prefix 2, Suffix 1 and Suffix 2 respectively.

Table 4a below shows the occurrence of prefixed and reduplication (RED) in 114 words which do not take any suffixes.

Table: 4a

Prefix 1	P r e f i x 2			RED	Total
	Ø	mən	pər		
Ø	-	-	-	8	8
bər	13	-	-	5	18
di	7	-	1	-	8
kə	1	-	-	-	1
mən	35	-	4	6	45
pə	2	5	-	-	7
pər	2	-	-	-	2
sə	15	-	-	-	15
tər	10	-	-	-	10
Total	85	5	4	19	114

Table 4b below shows the occurrence of suffixes in 124 words. Each word has a suffix with or without a prefix or reduplication (RED).

Table: 4b

Prefix, RED	S u f f i x									Total
	an	i	kah	kan	ku	lah	mu	na	pun	
Ø	15	3	2	3	1	9	1	35	2	71
bər	2	-	-	-	-	2	-	-	-	4
dɪ	-	1	-	2	-	-	-	1	-	4
kə	25	-	-	-	-	-	-	-	-	25
mən	-	3	-	9	-	-	-	-	-	9
pə	1	-	-	-	-	-	-	-	-	1
pər	-	2	-	-	-	2	-	-	-	4
RED	3	-	-	-	-	-	-	-	-	3
Total	46	9	2	14	1	13	1	36	2	124

Table 4c below shows the occurrence of affixes and reduplication (RED) in 18 words - the remaining sample words, which cannot be captured in tables (4a,4b) above. Dots are used to indicate that the prefix on the left applies together with the items (affixes or reduplication) on the top of the columns of the numbers. The numbers themselves show the frequency of the occurrences of the affixes on the top of the columns together with the prefixes on the left.

Table: 4c

Prefix 1	Prefix 2		RED	Suffix (1,2)		Total
	mən	pər		an	i kan na	
bər	1....1				1
di	4.....4				4
kə	1.....1				1
mən	3.....3				3
	4.....4				4
	1.....1				1
pə	.4.....	4				4

Total: 18

Tables (4b,4c) above show that prefixes may co-occur with most suffixes in BI. In fact, some prefixes always function together simultaneously with certain suffixes in the construction of certain types of words. This kind of pairs of prefix and suffix may be referred to as 'simultaneous affixes' (simulfix). The most productive pairs are /kə ... an/ 'abstract noun forming simulfix', /pə ... an/ 'noun forming simulfix', /pər ... an/ 'noun forming simulfix' and /pər ... kan/ 'causative transitive verb forming simulfix'. The simulfix /kə... an/ may be added to adjective stems (cf. 3.5:2; 3.8:3; 3.9:4; 3.14:1b) and to certain noun stems (cf. 3.7:4). The simulfix /pə ... an/ may be added to certain verb stems (cf. 3.5:5; 3.8:5) and to certain noun stems (cf. 3.6:4).⁵

5. Note however that the examples (3.5:5; 3.8:5) both have /mən/ in the underlying representation.

The simulfix /pər ... an/ may be added to certain noun stems such as persekolahan [pərsəkolahan] 'school system' (←-- /səkolah/ [səkolah] 'school' + /pər...an/), perusahaan [pərusahaʔan] 'enterprise matters' (←-- /usaha/ [usaha] 'enterprise, effort' + /pər...an/) etc and to certain verb stems such as pertemuan [pərtəmuən] 'meeting' (←-- /təmu/ [təmu] 'meet' + /pər...an/), pertengkaran [pərtəŋkaran] 'a quarrel' (←-- /təŋkar/ [təŋkar] 'to quarrel' + /pər...an/) etc. The simulfix /pər...kan/ may be added to certain noun stems such as persoalkan [pərsəalkan] 'to raise question on' (←-- /soal/ [soal] 'question' + /pər...kan/), perhatikan [pərhətakan] 'to pay attention to' (←-- /hati/ [hati] 'heart' + /pər...kan/) etc., and to certain verb stems such as pertunjukkan [məpərtuŋʃukan] 'to show' (←-- /tuŋʃuk/[tuŋʃʊʔ] 'to show, point' + /pər...kan/), perdengarkan [pərdəŋarkan] 'to play (music) for others to listen to' (←-- /dəŋar/ [dəŋar] 'to listen' + /pər...kan/) etc.

Table 4c shows furthermore, that certain words may have three affixes (i.e. two prefixes and one suffix or one prefix and two suffixes) each. There are in fact a number of words that have more than three affixes each such as pendidikannyalah [pəndidikanpalah] 'it is his/her education' (←-- /pə+mən+didik+an+pa+lah/), dipertunjukkanannyalah [dipərtuŋʃukanpalah] 'then it was shown by him/her' (←-- /di+pər+tuŋʃuk+kan+pa+lah/) etc.

3.4 A Note on Word Analyses

It will have been noticed in the examples given in Section 3.3 above that the prefix /mən/ postulated in the underlying representation of a certain type of words - words containing the prefix /pə/ with or without the suffix /an/, such as penari 'dancer' (cf. 3.6:5), pendidikan 'education' (cf. 3.5:5), pemuaian 'expansion, extension' (cf. 3.8:5) etc. is phonetically realised either as a nasal or 'zero' depending upon the sound that immediately follows it. The nasal realisation of the /mən/ prefix occurs when it is immediately followed by an obstruent or vowel, and the 'zero' realisation occurs when it is immediately followed by the other types of sounds - nasals, liquids and semi vowels.

Works on BI that I am aware of so far make no postulation of the prefix /mən/ in the analysis of words of the type cited above. The common practice among scholars working on BI is to analyse the three words above as peN + tari, peN + didik + an and peN + muai + an respectively, then to describe how the morpheme (prefix) peN- has several allomorphs which are phonologically definable. The nasal segment (N) in the prefix peN- is homorganic with stops, fricatives or vowels following it, and it becomes 'zero' before the other types of sounds. It will soon become clear that this sort of analysis is not phonologically plausible. It fails to

to account for the pairs of words in (3.15) below where the prefix pe- in a-items and the prefix peN- in b-items both have the same function, i.e. to form an agent noun from a verb stem. Note that the a-items are in the following examples usually treated as exceptions to the nasal assimilation process described above.

(The analysis given below is based on the surface body (to)')

structure of the words). 4. a. petinju [pətinju] 'a boxer' (← pettinju (3.15)

b. peninju [pəninju] 'the person who punched

1. a. pekerja [pəkərja] 'a

(← peN+tinju 'to fish

b. pengerja [pəŋərja] '1

5. a. pedagang [pədagaŋ] 'a trader/businessman' (← peN+kerja 'to work')

2. a. peserta [pəsəta] 'a participant' (← pe+serta 'to participate, to accompany')

b. penyerta [pəpəta] 'the company' (← peN+serta 'to participate, to accompany')

3. a. pesuruh [pəsuruh] 'a janitor' (← pe+suruh 'to order, [pəpuruh] to send somebody to')

b. penyuruh [pəpuruh] 'the person who ordered/sent someone (← peN+suruh 'to order/send body (to)')

4. a. petinju [pətinju] 'a boxer' (← pettinju 'to fist')

b. peninju [pəninju] 'the person who punched (someone)' (← peN+tinju 'to fist')

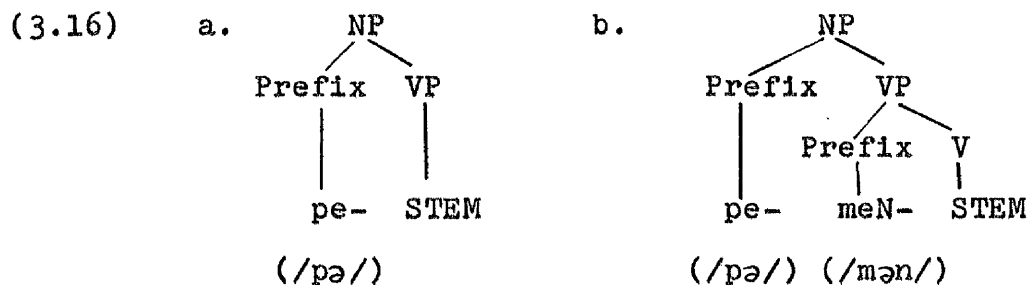
5. a. pedagang [pədagaŋ] 'a trader/businessman' (← pe+dagang 'to trade')

b. pendagang [pəndagaŋ] 'the person who sold goods' (← peN+dagang 'to trade')

To regard pe- and peN- in the above examples as two different prefixes (morphemes) will be against the intuitive knowledge of the native speakers about their language, especially the knowledge of words that the generative phonologist seeks to describe. Most native speakers of BI will feel that the difference in meaning in each of the above pairs of words (nouns) is not much subject to the prefixes pe- and peN- but rather to the type of verbs that each of those pairs is associated with. The a-items (i.e. items with the prefix pe-) in examples (3.15) above are usually associated with verbs consisting of verb stems plus /bər-/ 'stative/adjectival verb prefix' (e.g. 3.15: 1a, 2a, 4a, 5a) or verb stems plus /di-/ 'passive voice verb prefix' (e.g. 3.15: 3a). The b-items (i.e. items with the prefix peN-) on the other hand, are usually associated with verbs consisting of verb stems plus /mən-/ 'active voice (transitive) verb prefix' with or without the prefix /-kan/ or /i/ (both are transitive verb forming suffixes). Thus when a native speaker of BI is asked to differentiate for example the pair pekerja vs pengerja (cf. 3.15: 1a, 1b), he is likely to define those items by saying, more or less, that pekerja 'worker' has something to do with (a person who) bekerja '(to) work' (← /bər/ + /kərʃa/ 'to work') and pengerja 'the executor of a job/plan' has something to do with (a person who) mengerjakan '(to) execute/do (something)' (← /mən+ /kərʃa/ 'to work/do (root)'). In a similar way, he will differentiate

pesuruh 'a janitor' (cf. 3.15:3a) from penyuruh 'the person who ordered or sent someone' (cf. 3.15:3b) by saying that pesuruh has something to do with (a person who is) disuruh 'be ordered/sent' (←- /di/ + /suruh/ 'to order/send (to)'), and penyuruh has something to do with (a person who) menyuruh '(to) order/send someone' (←- /mən/ + /suruh/ 'to order/send someone').

The problem related to the (surface) prefixes pe- and peN- in the above examples (3.15) in which both perform the same function, can be solved by establishing two different structural patterns in the underlying representation. The two types of items illustrated by examples (3.15) above can be represented, respectively, by the phrase markers (structures) a and b in (3.16) below.



Note however that the structure a above represents items (nouns) which are usually associated with verbs containing /bə-/ or /di-/, but since those prefixes never appear on the surface forms one finds no particular need to postulate them in the underlying representation. On the other hand, the structure b represents items (nouns) which are usually associated with verbs containing the

prefix /mən/, and although the prefix does not always appear on the surface forms, the 'zero' realisation of the prefix, as we saw early in this section, is phonologically definable.

In a similar way one can account for the pairs of items in (3.17) below which are closely related to the pairs given (3.15) above. The a-items in the following examples are constructed by adding /pər ... an/ 'noun forming simulfix' to (verb) stems, and the b-items are constructed by adding /pə... an/ 'noun forming simulfix' to verbs beginning with (postulated) /mən/. Like in examples (3.15), the a-items in the following examples are associated with verbs beginning with the prefix /bər/, and the b-items are associated with verbs beginning with the prefix /mən/.

(3.17)

1. a. pekerjaan [pəkərʃaʔan] 'work, occupation' (←- /kərʃa/ 'to work' (root) + /pər ... an/)
 b. pengerjaan [pənərʃaʔan] 'the execution of a job/plan' (←-(/mən/)+/kərʃa/'to work'+/pə...an/)
2. a. pesertaan [pəsərtaʔan] 'participation' (←- /sərta/'to participate/accompany'(root)+/pər...an/)
 b. penyertaan [pənərtaʔan] 'the act of accompanying' (←-(/mən/)+/sərta/ 'to accompany'+/pə...an/)
3. a. *persuruhan
 b. penyuruhan [pənuruhan] 'the act of ordering/sending someone' (←- (/mən/)+/suruh/'to order/send'/pə...an/)
4. a. pertinjuan [pərtinjʊan] 'matters related to boxing'

/tɪŋʃu/ 'to fist'(root)'+/pər...an/)

b. peninjuan [pənɪŋʃuan] 'the act of punching' (← (/mən/)

/tɪŋʃu/ 'to fist'+ /pə...an/)

5. a. perdagangan [pərdagangan] 'matters related to trades'

(← /dagaŋ/ 'to trade (root)'+/pər...an/)

b. pendagangan [pəndagangan] 'the act of trading/selling

goods' (← (/mən)+/dagaŋ/ 'to trade'+/pə...

an/).

Notice that the prefix /pər/ in examples (3.17:1a,2a)

above is phonetically realised as [pə] because it occurs

before a syllable containing -er (cf. Section 5.1).

Notice furthermore, that the form *persuruhan is not

acceptable. Nor is the form *bersuruh. The fact that

there is no verb *bersuruh in BI with which the form

*persuruhan can be associated does not necessarily mean

that the prefix /bər/ needs to be postulated in the under-

lying representation of words of the a type in the above

examples. The question whether a certain stem can have

the simulfix /pər...an/ cannot be solved by the postulation

of /bər/ in the underlying representation of those items

because it has yet to be decided whether the stem in

question can be prefixed with /bər/ or not. In other

words, the affixation of stems with /pər...an/ or /bər/

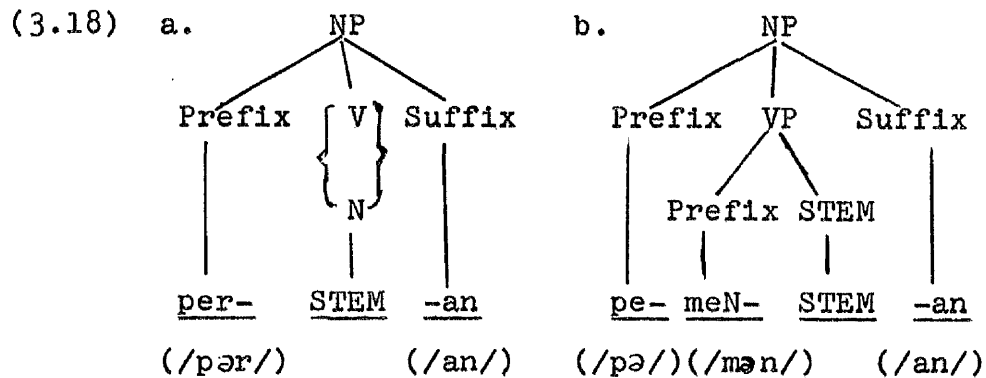
depends largely upon the type of stems.

The two types of words illustrated by

examples (3.17) above can be represented on the phonolog-

ical level by the structures a and b respectively.⁶

6. Note however that /pə...an/ can be added to a number of noun stems where /mən/ is not postulated in the underlying representation (cf. 3.6:4).



This chapter, especially the last section, has been devoted to the discussion of the morphology of BI. Its relevance to the phonology of BI however is undoubtedly significant. Moreover, since the greater part of a phonological description is concerned with words, it is desirable to deal with morphological processes that are relevant to the clarity of the phonological description of the language in question.

In the current generative grammar framework, the discussion of morphological processes (if any) will appear piecemeal in the syntactic and phonological components of the grammar. The framework described by Chomsky (1965), which has been widely accepted by linguists, apparently gives no room for the discussion of derivational morphology in the grammar. It is claimed that derived nominals are entered directly into the underlying structure from the lexicon like other formatives or morphemes without describing the processes of their formation. (In the 1957 version of the generative theory, this type of nouns is derived by transformation rules - thus the processes of derivation are accounted for). While the

generative linguist seeks to describe the competence or the tacit knowledge of words and the rules that govern the manner in which morphemes are put together to yield those words, the current generative framework lacks mechanisms for the treatment of the morphological aspects.

The inappropriate treatment of morphology in the current generative framework has led some linguists (e.g. Halle, 1973 etc) to propose a 'word formation' component within a generative framework, where morphology can be dealt with in its own right. The discussion of stems, affixes and some word constructions in this chapter will probably give a partial answer to the proposed 'word formation' component.

CHAPTER 4
MORPHEME STRUCTURE CONDITIONS

Although the notion of 'redundancy' has long been recognized in phonological analysis (for example in an inventory of phonemes of a language where 'redundant features' are in a way held responsible for the existence of variants or allophones), the concept of 'phonological redundancy' has gained considerable significance in the theoretical framework of generative phonology. It has developed along with the concept of simplicity - a concept which forms part of generative theory. Thus Chomsky (1962:p.233) writes

"... we must apparently do what any scientist does when faced with the task of constructing a theory to account for particular subject matter-- namely, try various ways and choose the simplest that can be found".

Simplicity has been made a basis or criterion for judging the relative merits of two or more competing descriptions of a particular language. The essential claim in generative grammar is that the simplicity metric (also called 'evaluation procedure' in the literature) must be part of or built into the theory. Chomsky (1962) goes on to say

"An important part of this theory will be a procedure of evaluation that will permit choice between alternative proposed grammars for particular languages" (p.245).

In practice, the simplicity metric has been associated, if not equated, with the number of features

required¹ to capture a generalisation. A description with fewer features is said to be simpler, more natural (thus more general) and more favoured than the one that utilizes more features. It is therefore desirable, Halle (1962:p.340) recommended, that "... we must omit features in all dictionary representations, whenever these can be introduced by a rule that is less costly than the saving it effects". These omissible features are redundant in the sense that they can be predicted from other (phonological and grammatical) features. Rules stating these redundancies are variously called 'morpheme structure rules (MSRs)' (Halle, 1959), 'morpheme structure conditions (MSCs)' (Stanley, 1967), 'lexical redundancy rules' (Chomsky and Halle, 1968) etc. The existence of the various terminologies not only shows that writers on generative phonology have devoted considerable attention to the redundancy aspect in phonology, but also indicates that generative phonologists have not reached any agreement on the type of framework for dealing with the phonological redundancies. The approach adopted in the present description is that proposed by Stanley (1967).

-
1. Many generative phonologists however have questioned the validity of feature counting as the only basis for the evaluation of descriptions because it fails to capture the degree of naturalness of sound classes so that, very often, what seems simpler (i.e. a class of sounds that requires fewer features to specify) is less natural, and what seems less simple is phonologically more natural (cf. Chen, 1973:p.226; Hyman, 1975:pp.139-142 etc).

After discussing a number of problems inherent in MSRs approach, such as the problem in choosing one feature over the other, the status of blank feature etc., Stanley (1967) proposed that MSRs be replaced with morpheme structure conditions (MSCs). He pointed out that MSRs are basically static in that they do not convert one level of representation into another, but rather simply state redundancies on the phonological level. Quite to the contrary, phonological rules proper (P-rules) convert phonological representations into phonetic ones. Thus, Stanley drew a crucial distinction between a constraint on a given level of representation and a rule that converts one level of representation into another. Once we take seriously the notion that a grammar contains rules as well representations, there is no reason to require that phonological representations should contain specifications only for all unpredictable (non-redundant) features, so long as the grammar as a whole allows us to determine what features are commutable and hence unpredictable (non-redundant) and what features are dependent and hence predictable (redundant).

In such terms, Stanley proposed that underlying (phonological) representations, like phonetic representations, should be fully specified for all features. An additional set of morpheme structure conditions or constraints then provides, for any given language, a specification of the range of possible segments and morphemes,

including dependencies that may exist between feature values. The morpheme structure conditions (MSCs) capture two kinds of redundancies - sequential and segmental redundancies.

The formal requirements for MSCs are

1. they may not change feature values
- ii. they are unordered
- iii. they operate within, and not across, morpheme boundaries.

In the present description MSCs are numbered for convenience of reference and discussion of similar aspects. The numbers do not imply any ordering in application. They are unordered because they may not change feature values.

The MSCs are expressed in terms of 'If-Then conditions'. Each pair of 'If-Then conditions' states that if a particular condition obtains in a certain environment, then some other condition must also be met.

This chapter is organized into three sections. The first section deals with sequential conditions within BI morphemes; the second section deals with segmental conditions, and the third section presents the summary of conditions formulated in the first two sections.

4.1 Sequential 'If-Then Conditions'

Sequential 'If-Then Conditions' state predictable (redundant) features resulting from the constraints on the

sequences of phonological segments within morphemes. The conditions formulated below are based mainly on the constraints or conditions that hold with native BI (Malay) items. However, some regularities in the sequences of phonological segments observed in borrowed items are also taken into account to the extent that the items have been naturalized in the sense that they no longer sound foreign and that they conform to the general constraints (positive conditions) stated in Section 3.1.

Greek letters α , β , γ in the following conditions (and also in P-rules in Chapter 5) stand for the plus and minus values of features, and they indicate agreement of values in different part of a condition (or rule).

4.1.1 Sequence of Consonants.

It has been pointed out in Section 3.1 that BI allows only two consonants to occur in a sequence within native items, and such sequences can only occur in word-medial position. BI imposes further restrictions on the types of consonants that may occur in a sequence. To find out the restrictions that BI systematically exhibits on the sequences of segments in the underlying form of morphemes, let us first examine consonant sequences found in the data (cf. Section 1.3) then formalize the regularities observed on those sequences.

Of the first two hundred morphemes containing

consonant sequences found in the data, 142 items (71 per cent) have sequences of nasals plus obstruents (cf. 4.1), 25 items (12.5 per cent) have sequences of the trill /r/ plus other consonants (cf. 4.2) and 33 items (16.5 per cent) contain various kinds of consonant sequences (cf. 4.3). Although the sample is small in number, it sufficiently reflects the constraints that BI systematically imposes on consonant sequences.

The following examples (4.1) show the summary of the sequences of nasals and obstruents in 142 items in the sample.

(4.1)	<u>Sequence</u>	<u>Percentage</u>	<u>Examples</u>
1. a.	m-p	10.5	/əmpat/ [əmpat] 'four' /pimpin/ [pimpin] 'to lead'
b.	m-b	11	/ambil/ [ambil] 'to take' /gambar/ [gambar] 'picture'
2. a.	n-t	16.5	/untuk/ [untʊ?] 'f o r' /ganti/ [ganti] 'to change'
b.	n-d	11	/indah/ [indah] 'beautiful' /pendek/ [pendɛ?] 'short'
3. a.	ɲ-ʈ	2	/lapɕar/ [lapɕar] 'fluent' /kupɕi/ [kupɕi] 'k e y'
b.	ɲ-ʃ	3	/ʃapɕi/ [ʃapɕi] 'promise' /banɕir/ [banɕir] 'flood'
4. a.	ŋ-k	7	/munɕin/ [munɕin] 'possible' /anjukaw/ [anjukaw] 'you'
b.	ŋ-g	8	/tinggi/ [tinggi] 'tall'

- thus excluding nasal, trill, lateral and fricative consonants - then the two consonants will agree on the features anterior, coronal and back. (Note that the condition or rule simply states well-formedness of morphemes containing sequences of nasals and non-sonorant, non-continuant consonants; it does not imply a blank-filling notion).

The following examples (4.2) show the occurrence of the sequence trill plus other consonants in 25 items in the sample.

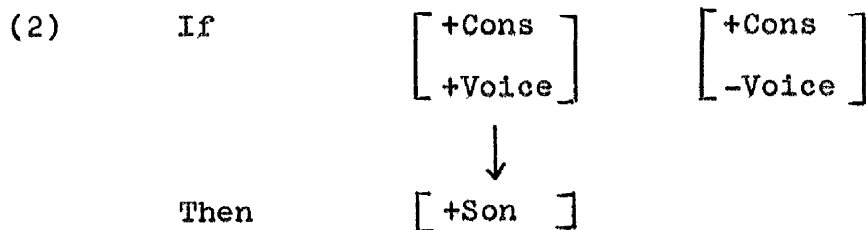
(4.2)	<u>Sequence</u>	<u>Percentage</u>	<u>Examples</u>
1.	r-b	2	/kərbaw/ [kərbaw] 'buffalo' /korban/ [korban] 'victim'
2.	r-d	1	/mərdəka/ [mərdəka] 'independent' /mərdə/ [mərdə] 'nice(of voice)'
3.	r-g	1	/harga/ [harga] 'price' /pərgi/ [pərgi] 'to go'
4.	r-ʃ	0.5	/kərʃa/ [kərʃa] 'to work'
5.	r-m	0.5	/pərmata/ [pərmata] 'jewel'
6.	r-n	2.5	/warna/ [warna] 'colour' /purnama/ [purnama] 'full moon'
7.	r-l	0.5	/pərlu/ [pərlu] 'to need'
8.	r-t	2.5	/arti/ [arti] 'meaning' /sərtə/ [sərtə] 'to accompany'
9.	r-k	1	/tərka/ [tərka] 'to guess' /pərkara/ [pərkara] 'matters'
10.	r-s	1	/bərsih/ [bərsih] 'clean' /kursi/ [kursi] 'chair'

11. r-č 0.5 /pərčaya/ [pərčaya] 'to believe'

The above examples show that /r/ may precede almost any type of consonants. This can easily be understood because, as we saw in Section 3.2, BI has three prefixes ending in /r/ (i.e. /bər/, /pər/ and /tər/) which can be added to stems beginning with any consonants or vowels.

A further examination of BI words shows that of the voiced consonants, only nasals, trill and, to some degree, lateral may occur as the first element of consonant sequences irrespective of whether the second element is a voiced or voiceless consonant. The occurrence of the lateral as the first element of consonant sequences is limited to loan words, such as /kalbu/ [kalbu] 'heart', (Arabic), /alpa/ [alpa] 'absent' (Dutch), /altar/ [altar] 'altar' (Dutch/English), /alkohol/ [alkohol] 'alcohol' (Dutch/English) etc. Other voiced consonants may also occur as the first element of consonant sequences but the second element must also be a voiced consonant (see the discussion of examples (4.3) below).

The constraints discussed above can be formalized as follows.



The condition (rule) states that if the second segment of a sequence of two consonants is a voiceless

consonant ([+Consonant,-Voice]) and the first segment is a voiced consonant, then it must be a sonorant sound ([+Consonant,+Voice,+Sonorant]) - i.e. a nasal or trill or lateral.

Examples (4.3) below show the summary of the various kinds of consonant sequences occurring in 33 items in the sample.

(4.3)	<u>Sequence</u>	<u>Percentage</u>	<u>Examples</u>
1.	s-t	3	/istəri/ [istəri] 'wife' /pasti/ [pasti] 'definite'
	s-l	0.5	/asli/ [asli] 'genuine'
2.	k-t	2	/waktu/ [waktu] 'time' /dokter/ [dokter] 'doctor'
	k-s	1	/paksa/ [paksa] 'to force' /laksana/[laksana] 'like'
	k-d	0.5	/dakdik/ [dakdik] 'frightened'
	k-n	1	/laknat/ [la?nat] 'punishment' /makna/ [ma?na] 'implication'
	k-l	0.5	/takluk/ [ta?lə?] 'surrender'
	k-r	0.5	/akrap/ [akrap] 'intimate'
	k-z	0.5	/takzim/ [ta?zim,ta?sim] 'respect'
3.	p-t	1	/saptu/ [saptu] 'Saturday' /səptember/[səptembər] 'September'
4.	h-t	0.5	/səjahtəra/[səjahtəra] 'prosperous'
	h-k	0.5	/bahkan/ [bahkan] 'even (conj)'
	h-š	0.5	/dahšat/ [dahsat,dahšat] 'enormous'
	h-b	0.5	/sahbandar/[sahbandar] 'port official'

	h-l	0.5	/ahli/ [ahli] 'expert'
	h-y	0.5	/səmbahyaŋ/[səmbahyaŋ] 'pray'
	h-w	0.5	/bahwa/ [bahwa] 'that (conj)'
5.	s-h	0.5	/mashur/[mashər] 'famous'
6.	m-r	0.5	/zamrut/[zamrət, ʝamrət] 'emerald'
	m-l	0.5	/ʝumlah/[ʝumlah] 'total, amount'
7.	l-m	0.5	/ilmu/ [ilmu] 'science, knowledge'
8.	b-r	0.5	/februari/[fəbruari, pəbruari] 'February'

The first five groups of the above consonant sequences (4.3: 1-5) show that when the first element (consonant) of a sequence of two consonants is voiceless, then the second element can be either a voiced or a voiceless consonant. They show no particular regularity which can be introduced by a rule. The last three groups (4.3: 6-8) on the other hand, show that the first and the second elements of those consonant sequences agree on the feature voice. They also suggest that the second element of a sequence of two consonants must be a voiced sonorant consonant when the first element is a voiced consonant. This is true with consonant sequences whose first element is a non-sonorant voiced consonant as in (4.4) below.

(4.4) /fəbruari/ [fəbruari, pəbruari] 'February' (cf. 4.3:8)

/kodrat/ [kodrat] 'nature, destiny'

/agraria/ [agraria] 'agriculture'

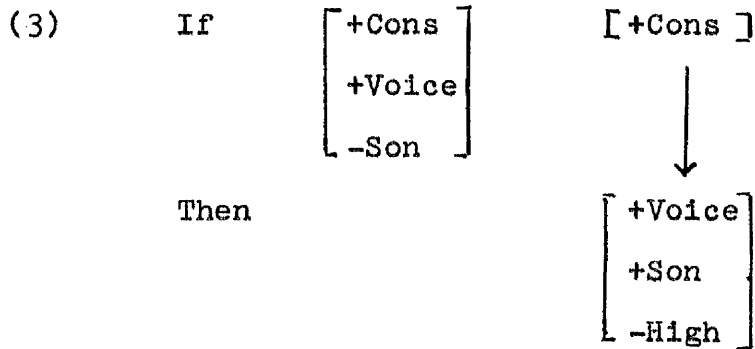
/hiʝrah/ [hiʝrah] 'to evacuate'

/tablet/ [tablət] 'tablet'

/signal/ [signal] 'signal' etc.

Note however the the palatal and velar nasals /p/ and /ŋ/ respectively never follow immediately voiced consonants. Note furthermore, that most, if not all, of the items appearing in (4.3) and (4.4) above are loan words.

The constraint on the sequence of two voiced consonants discussed above can be formulated as follows.



The condition states that if the first element of a sequence of two consonants is specified as a non-sonorant voiced consonant ($[+\text{Consonant}, +\text{Voice}, -\text{Sonorant}]$), then the second must be a non-high sonorant consonant ($[+\text{Consonant}, +\text{Voice}, +\text{Sonorant}, -\text{High}]$). The feature specification $[-\text{High}]$ blocks the nasals /p/ and /ŋ/.

In (4.3) above, we find no consonant sequence whose first element is /ç/. This is not because of the limitedness of the sample. The sequence /ç/ plus other consonants does not occur on the phonological level of representation in BI. Condition (3) above on the other hand states that the sequence /ʃ/ plus non-back sonorant consonants is admissible. The following condition predicts the occurrence of /ʃ/ and blocks, in a way, the

The condition states that if the first segment of a sequence of two non-syllabic segments is specified as a glide then it must be the voiceless glottal fricative /h/ ([-Consonant,-Syllabic,-Voice,+Low,+Continuant]). And if the second segment is further specified as a glide then it must be voiced (i.e. /w/ or /y/). The second part of the condition blocks the occurrence of h-h which is inadmissible. (In fact, BI does not allow sequences of two identical consonants or glides).

4.1.2 Sequences of Vowels.

In Section 2.2 six vowels were posited for the representation of morphemes on the phonological level. And in Section 3.1 we saw that BI allows only two vowels at the maximum to occur in a sequence within morphemes. Theoretically, there are 36 possible vowel sequences. A further examination of BI morphemes however, shows that some of the possible sequences (e.g. sequences containing the central mid vowel /ə/) do not occur at all, and some (e.g. sequences containing a front or back mid vowel, sequences of two identical vowels etc) occur only in a handful of (mostly non-Malay) items.

In the data there are 53 morphemes containing eleven different vowel sequences. The following examples (4.5) show the types of vowel sequences occurring in the 53 items found in the data.

(4.5)	<u>Sequence</u>	<u>Percentage</u>	<u>Examples</u>
1.	i-a	24.5	/ dia / [dia] 'he,she' / tiap/ [tiap] 'every,each'
	i-u	1.9	/ tiup/ [tiap] 'to blow'
	i-o	1.9	/radio/ [radio] 'radio'
2.	u-a	32	/ tua / [tua] 'old' / buah/ [buah] 'fruit'
	u-e	1.9	/ kue / [k u e] 'cake'
	u-u	1.9	/ suun/ [suʔʌn] 'rice noodle'
3.	a-i	13.2	/ baik/ [baiʔ] 'good' /a i r/ [a i r] 'water'
	a-u	9.4	/m a u/ [m a u] 'to want' /ʔauh/ [ʔauh] 'far'
	a-e	1.9	/daerah/[daerah] 'region'
	a-a	7.6	/saat/ [saʔat] 'time,moment' /maaf/ [maʔaf,maʔap]'sorry'
4.	o-a	3.8	/ doa/ [d o a, doʔa] 'prayer' /soal/ [soal, soʔal]'question'

The above examples suggest that the common vowel sequences in BI are those of high and low vowels (u-a, i-a) and of low and high vowels (a-i, a-u). Other common vowel sequences which are not shown by examples (4.5) above are sequences of two non-identical high vowels (i-u, u-i) as in (4.6) below.

- (4.6) 1. / t i u p / [t i ʊ p] 'to blow' (cf. 4.5:1)
 / ʔ i u m / [ʔ i ʊ m] 'to kiss, to smell'
 / s i u l / [s i ʊ l] 'to whistle'
 / l i u r / [l i ʊ r] 'saliva'
 / r i u h / [r i ʊ h] 'noisy' etc.

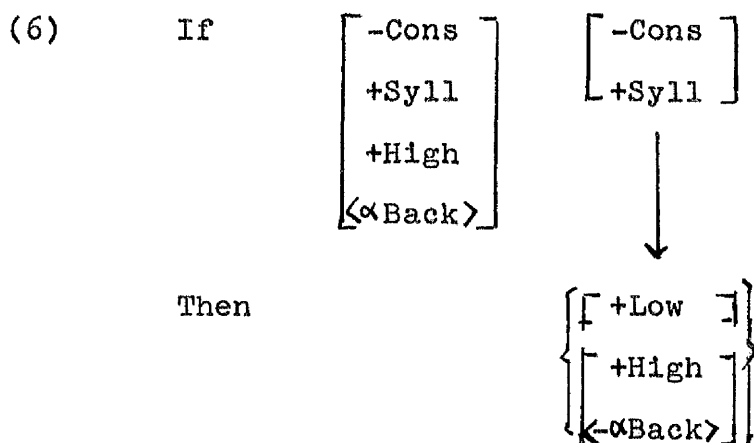
2. / d u i t / [duɪt, duwɪt] 'money'
 / k u i l / [k u ɾ l] 'temple'
 / b u i h / [b u i h] 'foam'
 / p u i ŋ / [p u ɾ ŋ] 'debris'
 / ʃ u i t a / [ʃ u i t a, ʃ u w i t a] 'lovely' etc.

The other occurring sequences are not common in the sense that they are exemplified only by a very small number of items each, and most of these items are loans. The vowel sequence a-a for example which appears to have a relatively high frequency of occurrence (7.6 per cent) in the data, occurs only in a few Arabic borrowed words. (As a matter of fact, all two-identical vowel sequences -- a-a, u-u, i-i, e-e and o-o -- occur in loan words only, and of the five sequences, only a-a has a relatively high frequency of occurrence while the others occur only in one or two items each, such as u-u in /suun/ [suʔən] 'rice noodle' (Chinese ?), i-i in /fiil/ [fiʔiɪl, piʔiɪl] 'character' (Arabic), e-e in /ʔəmeeh/ [ʔəme:h, ʔəmeʔeh] 'to belittle' (Sundanese), and o-o in /ʔəmooh/ [ʔəmo:h, ʔəmoʔoh] 'to mock at' (Minang) etc).

If rules (conditions) are to capture true 'linguistically significant generalisations', those facts must be taken into account. For this reason, some MSCs set up below are marked NATIVE to indicate that they hold true mainly with native BI items.

Examples (4.5:1-2) and (4.6) show that a high vowel may be followed by a low vowel or by another high vowel. Sequences of high and mid vowels occur only in a

few loan words such as i-e in /hieraki/ [hieraki] 'hierarchy' (Dutch/English), i-o in /bioskop/ [bioskɔp] 'movies' (Dutch/English), /kios/ [kios] 'kiosk' (Dutch/English), u-e in /k u e/ [k u e, kuwe] 'cake' (Chinese?), /duel/ [duɛl] 'dual' (Dutch/English) etc. The constraint on vowels that may follow a high vowel in native BI items discussed above can be stated as follows.

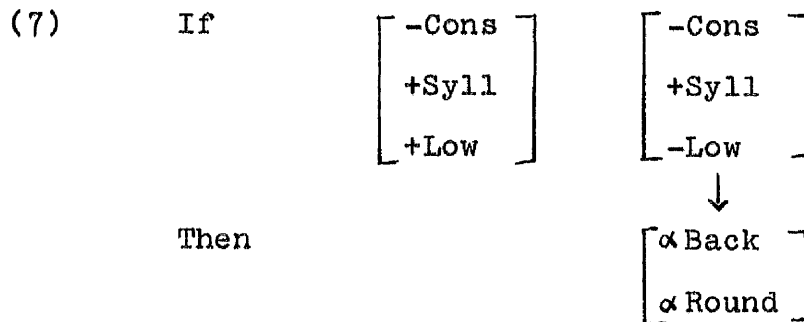


Condition: NATIVE BI

The condition states that if the first vowel of a sequence of two vowels is a high vowel ([-Consonant, +Syllabic, +High]), then the second will be either a low vowel (i.e. /a/ - [-Consonant, +Syllabic, +Low]) or a high vowel; the first and the second (high) vowels must have reversed specifications for the feature back. The condition excludes the sequences i-e, i-i, u-e, and u-u which occur in loan items only.

Examples (4.5:3) above show that /a/ may be immediately followed by a high vowel (/i/ or /u/), or by a mid vowel (/e/). The vowel /a/ may also be immediately followed by /o/ as in /laos/ [laɔs] 'ginger',

/kaok/ [kaɔʔ] 'to shout' etc. Items containing the sequences a-e and a-o are very few in number. The constraint on the vowels that may immediately follow /a/ can be stated as follows.

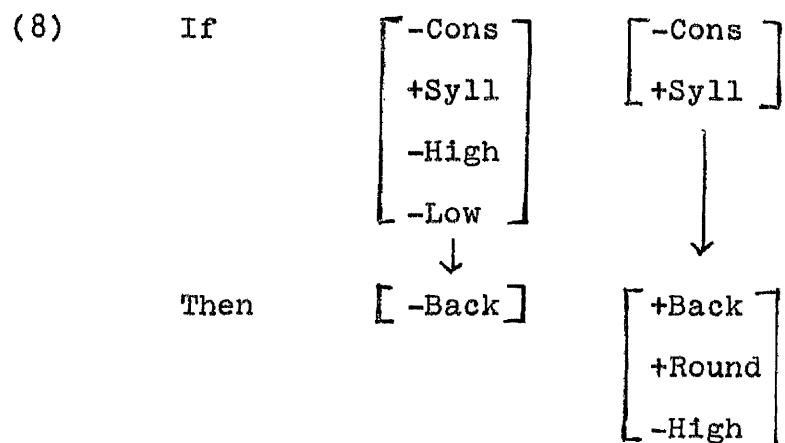


The condition states that if the first vowel of a sequence of two vowels is specified as a low vowel ([-Consonant,+Syllabic,+Low]) and the second vowel is a non-low vowel, then it must be a round back vowel (i.e. /u/ or /o/) or a front non-round vowel (i.e. /i/ or /e/). The condition blocks the occurrence of /ə/ which has the feature specifications [+Back,-Round].

Examples (4.5:4) show the occurrence of the sequence o-a. This vowel sequence occurs only in a few loan items. The items /doa/ and /soal/ given in (4.5:4) above are both Arabic borrowed words. Vowel sequences containing mid vowels are not common in native BI words. Of the three phonological mid vowels (/e/, /ə/ and /o/) posited in Chapter 2, only /e/ may occur as the first segment of a sequence of two vowels in native BI items. This vowel may immediately be followed by /o/ only as in /b e o/ [b e o] 'parrot', /keɔŋ/ [keɔŋ] 'snail', /meɔŋ/ [meɔŋ] 'miaow' etc.² The above constraint can be stated

2. There is one item which contains the sequence e-a namely bea [bea] 'tax' but this form alternates with bia [bia] and therefore it is justifiable to take the latter as the underlying form of the morpheme. The former alternant can be accounted for by a lowering rule (see P-rule 2).

as follows.



Condition: NATIVE BI

The condition (rule) states that if the first vowel of a sequence of two vowels is a mid vowel then it must be /e/ ([-Consonant,+Syllabic,-High,-Low,-Back]), and the second will be a back rounded mid vowel ([-Consonant,+Syllabic,+Back,+Round,-High]). The condition excludes the sequences e-i, e-e, o-i, o-a and o-o which occur in a few loan items.

In addition to the constraints on vowel sequences described above, BI also imposes constraints on the types of vowels that may occur in the last two syllables of morphemes. Since juxtaposed vowels that may occur in this environment have been captured by the last three conditions (rules), the following conditions are intended to capture constraints on the last two vowels of morphemes with one or two consonants intervening in between. The constraints discussed below revolve around the distribution of mid vowels.

The following examples (4.7) show that when the vowel of the final syllable of a morpheme is high (/i/ or

/u/), the vowel of the penultimate syllable will be any vowel except the front and back mid vowels (/e/ and /o/).

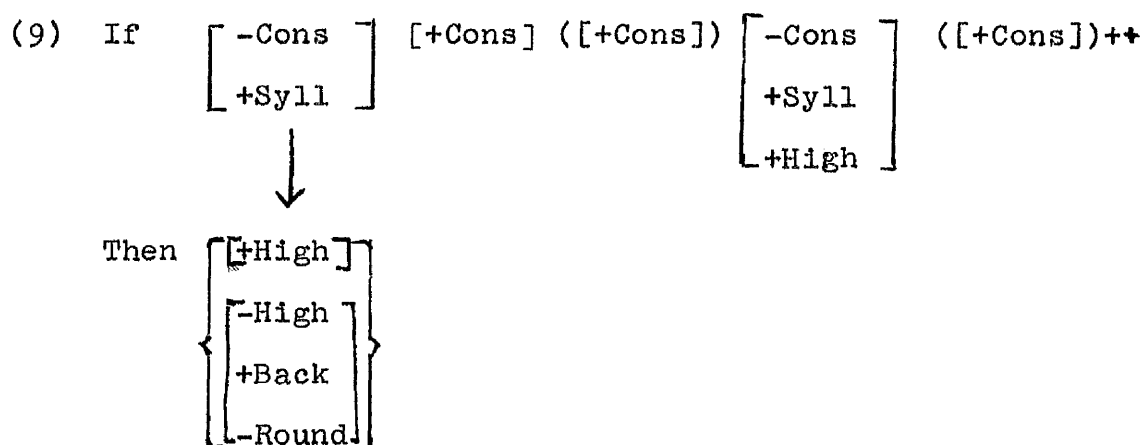
(4.7)

- | | |
|------------------------------|---------------------------------|
| 1a. /i n i/ [i n i] 'this' | 1b. /sibuk/[sibʊ?] 'busy' |
| /pimpin/[pimpin] 'lead' | /pintu/[pintu] 'door' |
| /tulis/ [tulɪs] 'write' | /duduk/[dudʊ?] 'sit' |
| /u ʃ i/ [u ʃ i] 'to test' | /tutup/[tutʌp] 'shut' |
| 2a. /səriŋ/ [səriŋ] 'often' | 2b. /səbut/[səbʊt] 'mention' |
| /bəli/ [bəli] 'buy' | /bentuk/[bɛntʌ?] 'shape' |
| /ləbih/ [ləbih] 'more' | /gəruk/ [gɛmʌ?] 'fat' |
| /sədih/ [sədih] 'sad' | /əmbun/ [əmbʊn] 'dew' |
| 3a. /a p i/ [a p i] 'fire' | 3b. /a b u/ [a b u] 'dust, ash' |
| /mati/ [mati] 'dead, die' | /takut/ [takʊt] 'afraid' |
| /rampin/[rampin] 'slim' | /anguk/ [aŋgʊ?] 'nod' |
| /nanti/ [nanti] 'later' | /bantu/ [bantu] 'help' etc. |

It must be noted however that there are a few recently borrowed items which deviate from the above condition, such as /seri/ [seri] 'series' (Dutch/English), /materi/ [materi] 'materials' (Dutch/English), /bendi/ [bendi] 'gig' (Sundanese), /bolu/ [bolu] 'pastry' (Chinese?). The constraint illustrated by examples (4.7) above can be stated as follows.

p 107

curl brackets + Sq brackets



Condition: NATIVE BI

The condition (rule) states that if the last vowel of a morpheme is specified as a high vowel (/i/ or /u/ - [-Consonant,+Syllabic,+High]) then the second last vowel of the morpheme will be either a high vowel ([-Consonant,+Syllabic,+High]) or a non-high non-round back vowel (i.e. /a/ - [-Consonant,+Syllabic,-High,+Back,-Round,+Low], or /ə/ - [-Consonant,+Syllabic,-High,+Back,-Round,-Low]). The condition excludes loan items like /seri/, materi/,/bendi/ etc. mentioned above.

Examples (4.8) below illustrate that /u/ never occurs in the penultimate syllable of morphemes when the final syllable is /o/.

- (4.8) 1. / tonton / [tontɔn] 'to watch'
 / bodoh / [bodoh] 'stupid'
 / o b o r / [o b ɔ r] 'torch'
2. / besok / [besɔ?] 'tomorrow'
 / benkok / [benkɔ?] 'bent, curved'
 / e k o r / [e k ɔ r] 'tail'

3. / ʔəbəl / [ʔəbəl] 'broken'
 / bəton / [bəton] 'concrete'
 / bətok / [bətoʔ] '(a kind of) fish'
4. / balok / [baloʔ] 'bar, block'
 / ʔago / [ʔago] 'cock, candidate'
 / rampok / [rampoʔ] 'to rob'
5. / k i l o / [k i l o] 'kilo'
 / pilon / [pilən] 'innocent'
 / sinkon / [sinkon] 'cassava' etc.

It should be noted however that the last three groups of the above examples are not very common.

The constraint illustrated by examples (4.8) above can be stated as follows.

$$\begin{array}{l}
 (10) \text{ If } \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \end{bmatrix} [+ \text{Cons}] ([+ \text{Cons}]) \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{High} \\ +\text{Round} \end{bmatrix} ([+ \text{Cons}])++ \\
 \quad \quad \quad \downarrow \\
 \text{Then } [-\text{Back}]
 \end{array}$$

The condition states that if the vowel of the last syllable of a morpheme is specified as a back mid vowel (/o/ - [-Consonant, +Syllabic, -High, +Round]) and the second last vowel as a high vowel, then it must be /i/ ([-Consonant, +Syllabic, +High, -Back]).

There is still another type of sequential constraints which can be accounted for here - constraints dealing with diphthongs. BI has three diphthongs viz.

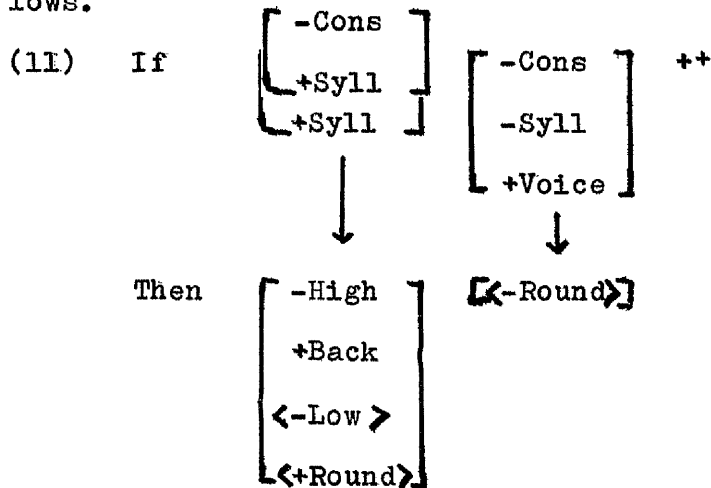
/ay/ [ay], /aw/ [aw] and /oy/ [oy] (equivalent to IPA [aɪ], [aʊ] and [oɪ] respectively). A diphthong is different from a sequence of two vowels in that its two segments belong to one syllable in the sense that they are uttered with one pulse of stress (cf. Henderson, 1971:pp.92,128; Abercrombie,1967:p.60; Catford,1977:pp. 215-16 etc), while the segments of a sequence of two vowels belong to two different syllables in the sense that they involve two impulses of stress in excitation. In other words, a diphthong has the feature specifications [-Consonant,+Syllabic] [-Consonant,-Syllabic], while a sequence of two vowels has the feature specifications [-Consonant,+Syllabic] [-Consonant,+Syllabic].

Distributionally, BI diphthongs occur only in morpheme final position as in (4.9) below.

- (4.9) 1. / panday / [panday] 'clever'
 / damay / [damay] 'peaceful'
 / sampay / [sampay] 'arrive, until'
 / pantay / [pantay] 'coast'
 / sunay / [sunay] 'river'
2. / kərbaw / [kərbaw] 'buffalo'
 / kəmaraw / [kəmaraw] 'dry season'
 / danaw / [danaw] 'lake'
 / əŋkaw / [əŋkaw] 'you (sing)'
 / pulaw / [pulaw] 'island'
3. / amboy / [amboy] 'hey, wow (interj)'
 / səpoy / [səpoy] 'breeze'

- / səkoy / [səkoy] 'a kind of wheat'
 / koboy / [koboy] 'cowboy'
 / amoy / [amoy] 'girl (of Chinese descent)'

The constraints on the type of vowels that may become the first element of a diphthong in BI can be stated as follows.



The condition states that if the final segment of a morpheme is specified as a voiced glide ([-Consonant, -Syllabic, +Voice]), and the second last segment as a vowel, then it will be either /a/ ([-Consonant, +Syllabic, -High, +Back, +Low, -Round]) or /o/ ([-Consonant, +Syllabic, -High, +Back, -Low, +Round]). The condition states, furthermore, that when the second last segment is /o/, the final glide must have the feature specification: [-Round] (i.e. /y/). Note that there are three vowels which have the feature specifications [-High, +Back], namely /a/, /o/ and /ə/. The vowel /ə/ however is blocked by the feature specification [+Round].

It must be noted however that the diphthong /oy/ occurs only in a very small number of morphemes.

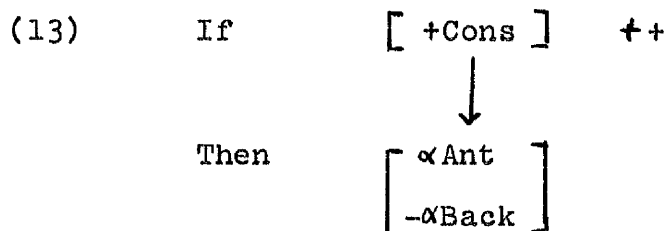
4.1.3 Final Segments

It was pointed out in Chapter 3 that morphemes in BI may end either in a vowel or a consonant. A further examination of BI morphemes shows that BI exhibits a number of constraints on the type of segments that may occur in morpheme-final position.

Examples (4.10) illustrate that voiced consonants that may occur in morpheme-final position are limited to sonorant consonants other than the palatal nasal /ɲ/.

- (4.10) 1. / ənam / [ənam] 'six'
 / dalam / [dalam] 'deep, inside'
 / pohon / [pohon] 'tree'
 / ikan / [ikan] 'fish'
 / undaŋ / [undaŋ] 'to invite'
 / hituŋ / [hituŋ] 'to count'
2. / asal / [asal] 'origin'
 / jual / [jual] 'to sell'
 / bətul / [bətəl] 'correct'
 / mahal / [mahal] 'expensive'
3. / akar / [akar] 'root'
 / bəsar / [bəsar] 'large'
 / ekor / [ekor] 'tail'
 / təlur / [tələr] 'egg'

The constraints on the type of voiced consonants that may occur in morpheme final position illustrated by examples (4.10) above can be formalized as follows.



The condition states that morpheme-final consonants must have the feature specifications either [+Anterior,-Back] (i.e. dentals/alveolars and labials), or [-Anterior,+Back] (i.e. velars). Palatals (/ʃ/, /ç/, /p/), which have the feature specifications [-Anterior,-Back], do not satisfy the condition (see also Condition (12)).

It was stated in Sub-section 2.2.5 that /ə/ does not occur in morpheme-final syllables in native BI (Malay) items. The occurrence of /ə/ in morpheme-final syllables is limited to loan words, such as (4.12) below.

- (4.12) /sərəm / [sərəm] 'frightening' (Javanese)
 /ruwət / [ruwət] 'complicated' (Javanese)
 /mərəm / [mərəm] 'to close one's eyes' (Javanese)
 /tantə / [tantə] 'aunt' (Dutch)
 /sendər/ [sendər] 'transmitter' (Dutch) etc.

The constraint on the type of vowels that may occur in morpheme-final syllable in native BI items can be stated as follows.

- (14) If $\begin{bmatrix} -\text{Cons} \\ -\text{Low} \end{bmatrix}$ $([+\text{Cons}]) ++$
- ↓
- Then $\begin{bmatrix} \alpha \text{ Back} \\ \alpha \text{ Round} \end{bmatrix}$
- Condition: NATIVE BI

The condition states that if the last vowel of a morpheme is specified as a non-low vowel then it will be a round back vowel (i.e. /u/ or /o/ - [-Consonant, -Low, +Back, +Round]) or a non-round front vowel (i.e. /i/ or /e/ - [-Consonant, -Low, -Back, -Round]). The vowel /ə/ which has the feature specifications [-Consonant, -Low, +Back, -Round] does not meet the Then condition. The condition is only true with native BI items.

4.2 Segmental 'If-Then Conditions'

Segmental 'If-Then Conditions' specify the range of possible segments and dependencies that exist between feature values. They state feature values which follow mechanically from other features in the same segment.

4.2.1 Consonants.

- (15) If $[+\text{Cons}]$
- ↓
- Then $[-\text{Syll}]$

All consonants in BI are redundantly [-Syllabic].

(16) If $\begin{bmatrix} +\text{Cons} \\ +\text{Son} \end{bmatrix}$



Then $\begin{bmatrix} +\text{Voice} \end{bmatrix}$

All sonorant consonants are redundantly $\begin{bmatrix} +\text{Voice} \end{bmatrix}$.

(17) If $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \end{bmatrix}$



Then $\begin{bmatrix} -\text{Son} \end{bmatrix}$

All voiceless consonants are redundantly $\begin{bmatrix} -\text{Sonorant} \end{bmatrix}$.

This condition reciprocates the statement made in (16).

(18) If $\begin{bmatrix} +\text{Cons} \\ +\text{Nasal} \end{bmatrix}$



Then $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \\ -\text{Cont} \end{bmatrix}$

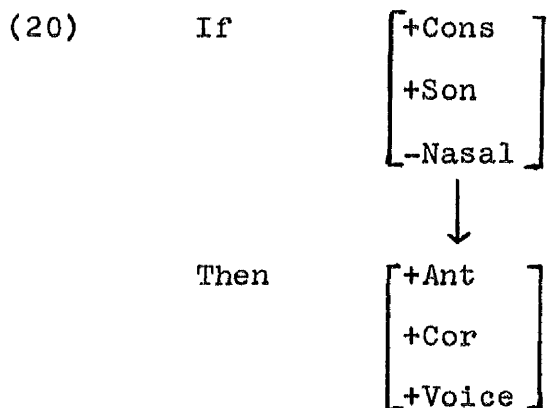
All nasal consonants are redundantly $\begin{bmatrix} +\text{Voice}, +\text{Sonorant}, \\ -\text{Continuant} \end{bmatrix}$.

(19) If $\begin{bmatrix} +\text{Cons} \\ +\text{Back} \end{bmatrix}$

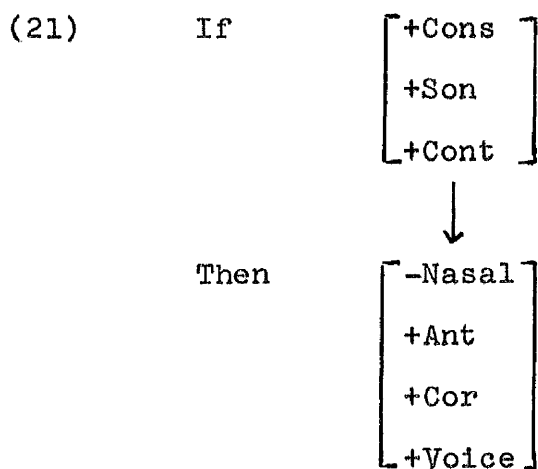


Then $\begin{bmatrix} -\text{Ant} \\ -\text{Cor} \end{bmatrix}$

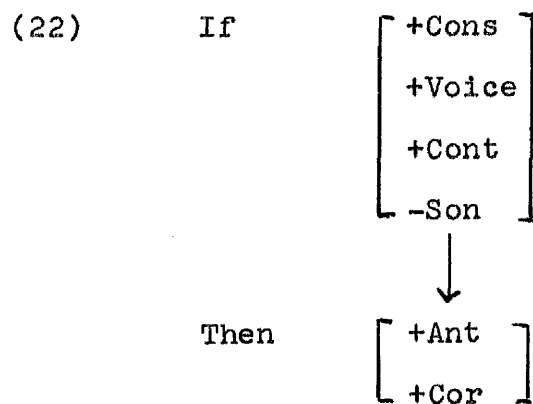
Any consonant with the feature specification $\begin{bmatrix} +\text{Back} \end{bmatrix}$ will acquire the redundant feature values $\begin{bmatrix} -\text{Anterior}, -\text{Coronal} \end{bmatrix}$



Non-nasal sonorant consonants are redundantly
[+Anterior,+Coronal,+Voice].



The only segment with the feature specifications
[+Consonant,+Sonorant,+Continuant] is the lateral alveolar
/l/. (Note that nasal and trill consonants are [+Consonant,
+Sonorant,-Continuant]).



The only segment with the feature specification [+Consonant,+Voice,+Continuant,-Sonorant] is the alveolar fricative /z/.

(23) If $\begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ +\text{Back} \end{bmatrix}$



Then [+Nasal]

There is only one back sonorant consonant viz. /ŋ/.

(24) If $\begin{bmatrix} +\text{Cons} \\ +\text{Cont} \\ +\text{Back} \end{bmatrix}$



Then [-Voice]

The only segment with the feature specifications [+Consonant,+Continuant,+Back] is the voiceless fricative /x/.

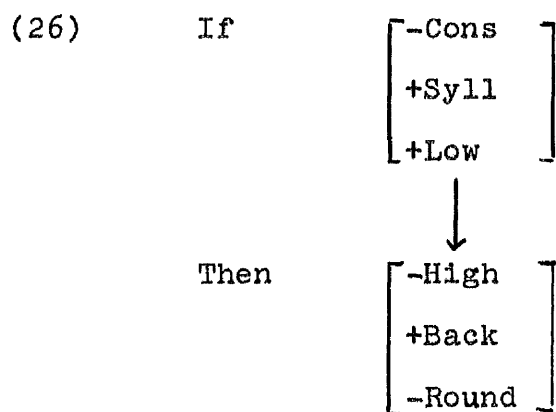
4.2.2. Vowels and Glides

(25) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix}$

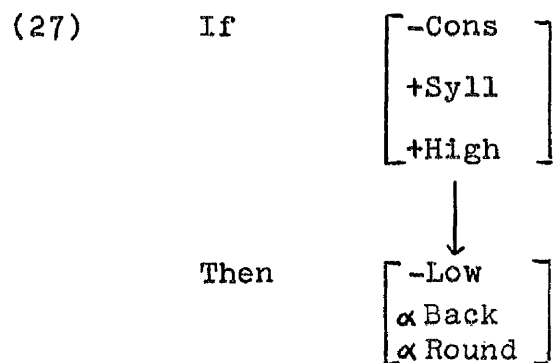


Then $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \end{bmatrix}$

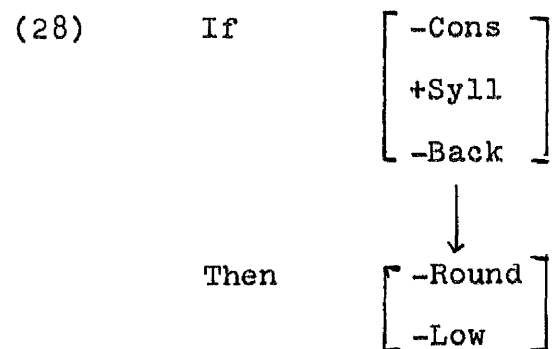
All vowels are redundantly [+Voice,+Sonorant].



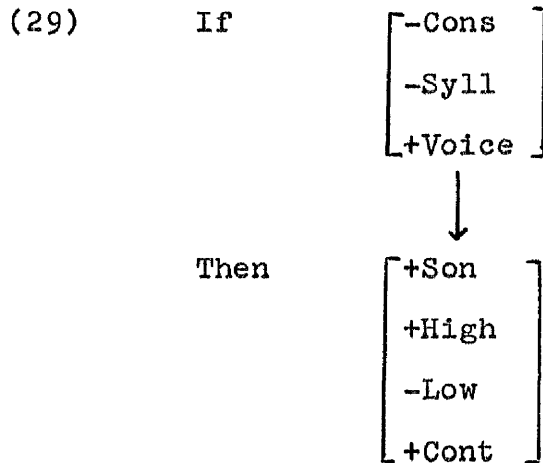
The only vowel with the feature specifications [-Consonant,+Syllabic,+Low] is /a/ which redundantly acquires the feature values [-High,+Back,-Round].



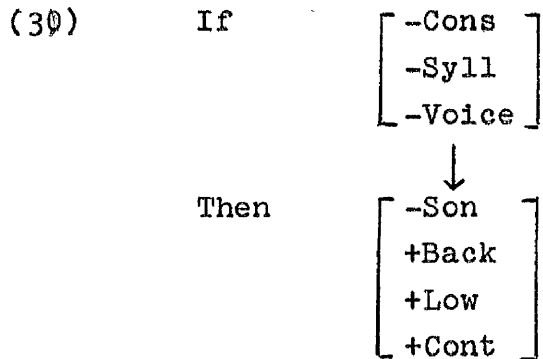
High vowels are redundantly [-Low] and always have the same specifications for the features back and round.



Front vowels are redundantly [-Round,-Low].



Voiced glides are redundantly [+Sonorant, +High, -Low, +Continuant].



Voiceless glides are redundantly [-Sonorant, +Back, +Low]. On the phonological level, the feature specification [+Continuant] is also redundant because there is only one voiceless glide on the phonological level of representation, viz /h/ (cf. Section 5.3).

4.3 Summary of 'Morpheme Structure Conditions' (MSCs)

This section presents the summary of conditions set up in the first two sections. Numbers of conditions are similar to those given in the previous sections.

- (1) If $\begin{bmatrix} +\text{Cons} \\ +\text{Nasal} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \\ -\text{Son} \\ -\text{Cont} \end{bmatrix}$
 \downarrow \downarrow
Then $\begin{bmatrix} \alpha \text{ Ant} \\ \beta \text{ Cor} \\ \emptyset \text{ Back} \end{bmatrix}$ $\begin{bmatrix} \alpha \text{ Ant} \\ \beta \text{ Cor} \\ \emptyset \text{ Back} \end{bmatrix}$
- (2) If $\begin{bmatrix} +\text{Cons} \\ +\text{Voice} \\ -\text{Son} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \end{bmatrix}$
 \downarrow
Then $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \\ -\text{High} \end{bmatrix}$
- (3) If $\begin{bmatrix} +\text{Cons} \\ +\text{Voice} \\ -\text{Son} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \end{bmatrix}$
 \downarrow
Then $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \\ -\text{High} \end{bmatrix}$
- (4) If $\begin{bmatrix} +\text{Cons} \\ -\text{Son} \\ -\text{Cont} \\ -\text{Ant} \\ -\text{Cor} \\ -\text{Back} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \end{bmatrix}$
 \downarrow \downarrow
Then $\begin{bmatrix} +\text{Voice} \end{bmatrix}$ $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \end{bmatrix}$
- (5) If $\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \end{bmatrix}$ $\begin{bmatrix} -\text{Syll} \\ \langle -\text{Cons} \rangle \end{bmatrix}$
 \downarrow \downarrow
Then $\begin{bmatrix} -\text{Voice} \\ +\text{Low} \\ +\text{Cont} \end{bmatrix}$ $\begin{bmatrix} \langle +\text{Voice} \rangle \end{bmatrix}$

(6) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \\ \langle \alpha \text{Back} \rangle \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix}$

↓

Then $\left\{ \begin{bmatrix} +\text{Low} \\ +\text{High} \\ \langle \alpha \text{Back} \rangle \end{bmatrix} \right\}$ Condition: NATIVE
BI

(7) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \end{bmatrix}$

↓

Then $\begin{bmatrix} \alpha \text{Back} \\ \alpha \text{Round} \end{bmatrix}$

(8) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{High} \\ -\text{Low} \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix}$

↓

Then $\begin{bmatrix} -\text{Back} \end{bmatrix}$ $\begin{bmatrix} +\text{Back} \\ +\text{Round} \\ -\text{High} \end{bmatrix}$ Condition: NATIVE
BI

(9) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \end{bmatrix}$ $(\begin{bmatrix} +\text{Cons} \end{bmatrix})$ $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \end{bmatrix}$ $(\begin{bmatrix} +\text{Cons} \end{bmatrix})^{++}$

↓

Then $\left\{ \begin{bmatrix} +\text{High} \\ -\text{High} \\ +\text{Back} \\ -\text{Round} \end{bmatrix} \right\}$

Condition: NATIVE BI

(10) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \end{bmatrix}$ $[\text{+Cons}]$ ($[\text{+Cons}]$) $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{High} \\ +\text{Round} \end{bmatrix}$ ($[\text{+Cons}]$) ++
 \downarrow

Then $[-\text{Back}]$

(11) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Voice} \end{bmatrix}$ ++
 \downarrow \downarrow
 Then $\begin{bmatrix} -\text{High} \\ +\text{Back} \\ <-\text{Low}> \\ <+\text{Round}> \end{bmatrix}$ $[\text{<}-\text{Round}>]$

(12) If $\begin{bmatrix} +\text{Cons} \\ +\text{Voice} \end{bmatrix}$ ++
 \downarrow
 Then $[\text{+Son}]$

(13) If $[\text{+Cons}]$ ++
 \downarrow
 Then $\begin{bmatrix} \alpha \text{ Ant} \\ -\alpha \text{ Back} \end{bmatrix}$

(14) If $\begin{bmatrix} -\text{Cons} \\ -\text{Low} \end{bmatrix}$ ($[\text{+Cons}]$) ++
 \downarrow
 Then $\begin{bmatrix} \alpha \text{ Back} \\ \alpha \text{ Round} \end{bmatrix}$

Condition: NATIVE BI

(15) If $[\text{+Cons}]$
 \downarrow
 Then $[-\text{Syll}]$

(16) If $\begin{bmatrix} +\text{Cons} \\ +\text{Son} \end{bmatrix}$
 ↓
 Then $\begin{bmatrix} +\text{Voice} \end{bmatrix}$

(17) If $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \end{bmatrix}$
 ↓
 Then $\begin{bmatrix} -\text{Son} \end{bmatrix}$

(18) If $\begin{bmatrix} +\text{Cons} \\ +\text{Nasal} \end{bmatrix}$
 ↓
 Then $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \\ -\text{Cont} \end{bmatrix}$

(19) If $\begin{bmatrix} +\text{Cons} \\ +\text{Back} \end{bmatrix}$
 ↓
 Then $\begin{bmatrix} -\text{Ant} \\ -\text{Cor} \end{bmatrix}$

(20) If $\begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \end{bmatrix}$
 ↓
 Then $\begin{bmatrix} +\text{Ant} \\ +\text{Cor} \\ +\text{Voice} \end{bmatrix}$

(21) If $\begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ +\text{Cont} \end{bmatrix}$
 ↓
 Then $\begin{bmatrix} -\text{Nasal} \\ +\text{Ant} \\ +\text{Cor} \\ +\text{Voice} \end{bmatrix}$

(22) If $\begin{bmatrix} +\text{Cons} \\ +\text{Voice} \\ +\text{Cont} \\ -\text{Son} \end{bmatrix}$



Then $\begin{bmatrix} +\text{Ant} \\ +\text{Cor} \end{bmatrix}$

(23) If $\begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ +\text{Back} \end{bmatrix}$



Then $\begin{bmatrix} +\text{Nasal} \end{bmatrix}$

(24) If $\begin{bmatrix} +\text{Cons} \\ +\text{Cont} \\ +\text{Back} \end{bmatrix}$



Then $\begin{bmatrix} -\text{Voice} \end{bmatrix}$

(25) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix}$



Then $\begin{bmatrix} +\text{Voice} \\ +\text{Son} \end{bmatrix}$

(26) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$



Then $\begin{bmatrix} -\text{High} \\ +\text{Back} \\ -\text{Round} \end{bmatrix}$

(27) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \end{bmatrix}$

↓

Then $\begin{bmatrix} -\text{Low} \\ \text{Back} \\ \text{Round} \end{bmatrix}$

(28) If $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Back} \end{bmatrix}$

↓

Then $\begin{bmatrix} -\text{Round} \\ -\text{Low} \end{bmatrix}$

(29) If $\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Voice} \end{bmatrix}$

↓

Then $\begin{bmatrix} +\text{Son} \\ +\text{High} \\ -\text{Low} \\ +\text{Cont} \end{bmatrix}$

(30) If $\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ -\text{Voice} \end{bmatrix}$

↓

Then $\begin{bmatrix} -\text{Son} \\ +\text{Back} \\ +\text{Low} \\ +\text{Cont} \end{bmatrix}$

CHAPTER 5
PHONOLOGICAL RULES

One fundamental conception in generative phonology is that each morpheme should have one and only one form on the phonological (systematic phonemic) level of representation. All variations in shape which a morpheme undergoes in various environments or contexts are to be derived by rules from the same underlying (phonological) form. While morpheme structure conditions (MSC's) are designed to specify the range of well-formed morphemes and segments on the phonological level independently from their environments, phonological rules proper (P-rules) are designed to specify alternations in shape that morphemes undergo in various environments. In such cases, the variations are no longer treated as the properties of individual morphemes, but are shown to follow from generally valid principles of the sound structure of the language in question.¹ In other words, the phonological rules proper (P-rules) are not intended to deal with particular forms of individual morphemes but rather with the sound structure and sound properties of the language.

The P-rules function in the following ways:

- i. they operate across morpheme boundaries
- ii. they change features, or delete, or insert, or coalesce segments

1. Cf. Anderson, 1974:pp.50-51.

- iii. they are partially ordered in the sense that certain pairs of rules have to be applied in order, otherwise the output of the derivation will be incorrect forms.

Basically, the ordering relation governs the operation of a pair of rules at a time. It has no direct bearing on the overall organization of the entire set of P-rules in which some independent rules (i.e. rules which require no particular order in their application) are placed or listed before others. Thus rule numbers in the following paragraphs do not necessarily indicate order relation between rules, unless so stated. Nor do they indicate the rank of rules in the sense that a rule with a small number does not necessarily mean that it is more productive than a rule with a bigger number because the rules are set up on the basis of aspects they account for rather than on the number of items on which each rule operates.

There are two types of P-rules in generative phonology, namely (a) word level rules and (b) transformational cyclic rules. The word level rules (sometimes also called phonetic rules in the literature - see e.g. Chomsky and Miller, 1963:p.314, Fischer-Jørgensen, 1975:p.245 etc) deal with segmental aspects of phonology on the word level, and the transformational cyclic rules deal with prosodic aspects of phonology on phrase and sentence levels. The main concern in this chapter however, is

the formulation of the former type of rules. The discussion of rules of the latter type is limited to accent placement rules on the word and phrase levels only. An attempt to deal with the transformational cyclic rules beyond the phrase level would involve the discussion of syntax, and this is not the concern of the present description.

This chapter is divided into eleven sections. Sections one through nine deal with a number of segmental aspects of the phonology of BI. Section 5.10 deals with accent placement on the word level, and Section 5.11 gives the summary of rules set up in the first ten sections.

5.1 Consonant Degemination and Trill Deletion

5.1.1 Consonant Degemination

It has been pointed out in Section 3.1 that the maximum sequence of consonants within morphemes in BI is CC, and this has further been stated in Sub-section 4.1.1 that no two identical consonants may occur in such sequence. This constraint extends to the phonetic level.

Since formatives (stems and affixes) may begin with and end in consonants, there are forms (i.e. words constructed by affixation) which contain sequences of two identical consonants in the underlying representation. Specifically, the following two-identical consonant sequences may occur on the phonological level of representation.

1. The sequence of two trills (r-r) resulting from the prefixing of /bər/, /pər-/, or /tər-/ to stems beginning with a trill such as (5.1:1)

- ii. The sequence of two velar stops (k-k) resulting from the suffixing of /-kan/, /-kah/ or /-ku/ to stems ending in a velar stop such as (5.1:2)
- iii. The sequence of two laterals (l-l) resulting from the suffixing of /-lah/ to stems ending in a lateral such as (5.1:3)
- iv. The sequence of two bilabial nasals (m-m) resulting from the suffixing of /-mu/ to stems ending in a bilabial nasal such as (5.1:4)

Notice that the above two-identical consonant sequences are degeminated on the phonetic level.

- (5.1) 1. / bər + rənən / [bərənən] 'to swim'
 / bər + ratus / [bəratəs] 'hundreds'
 / pər + rumah + an / [pərumahan] 'housing system'
 / pər + rəndah / [pərəndah] 'to lower'
 / tər + rasa / [tərasa] 'to feel (adjectival)'
 / tər + ramay / [təramay] 'the most crowded part'
2. / naik + kan / [naikan] 'to raise'
 / tunjuk + kan / [tunjukan] 'to show something'
 / enak + kah / [enakah] 'is it delicious'
 / rusak + kah / [rusakah] 'is it broken'
 / bapak + ku / [bapaku] 'my father'
 / anak + ku / [anaku] 'my son/daughter'
3. / ambil + lah / [ambilah] 'take (it)'
 / tinggal + lah / [tinggalah] 'stay (please)'
 / jual + lah / [jualah] 'sell (it)'
4. / kaum + mu / [kaumu] 'your folk (group)'
 / ayam + mu / [ayamu] 'your hen'
 / minum + mu / [minumu] 'your drink'

It must be noted however, that in slow and deliberate speech the two-identical consonant sequences are lengthened rather than degeminated.² In the case of the sequence k-k (cf. 5.1:2) one may even hear the sequence ʔ-k, i.e. the first velar stop is realised as a glottal stop, which is the common realisation of / k / in morpheme final position. For this reason, the rule set up below has to be regarded as an optional rule.

P-rule: Degemination

$$(1) \quad \begin{bmatrix} C \\ Fn \end{bmatrix} + \begin{bmatrix} C \\ Fn \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ Fn \end{bmatrix}$$

where C stands for any consonant segment and Fn for a specific bundle of features.

The rule says that a sequence of two identical consonants may be phonetically realised as a single consonant.

5.1.2 Trill deletion

Here we are going to deal with the deletion of the final / r / in the prefixes /bər/, /pər/ and /tər/. We saw in examples (5.1:1) above that the sequence r-r (resulting from the prefixing of those prefixes to stems beginning with a trill) is phonetically realised as a single [r] in normal speech, and this phenomenon is perfectly captured by the degemination rule (P-rule 1)

2. The sequence r-r however is always pronounced as a single [r].

set up above. The rule does not indicate whether the first segment (or the second) of the r-r sequence is deleted or not.

A further examination of the phonetic shapes of those prefixes shows that there is a good reason for regarding the final / r / in those prefixes as being deleted rather than degeminated when they combine with stems beginning with a trill. That is, we may regard that /bər/, /pər/ and /tər/ are, respectively, realised as [bə], [pə] and [tə] before a trill. This fact has been reflected in the orthographic system in that /bər/, /pər/ and /tər/ are respectively spelt as be-, pe- and te- before stems beginning with a trill and as ber-, per- and ter- before other sounds. In other words, the forms be-, pe- and te- are considered to be the correct forms of syllables when words consisting of those prefixes and stems beginning with a trill are divided into syllables, such as beratus (be-ra-tus) 'hundreds', perendah (pe-ren-dah) 'to lower', terasa (te-ra-sa) 'to feel (adjectival)' (cf. 5.1:1) etc.

In addition to the environment discussed above, the forms be-, pe- and te- (or [bə], [pə] and [tə]) also occur before stems whose first syllable consists of a consonant plus a central mid vowel plus a trill as in (5.2) below.

- (5.2) 1. bekerja /bər + kərʃa / [bəkərʃa] 'to work'
beserta /bər + sərtə / [bəsertə] 'together,
 'participate'

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tekerjakan

- beternak /bər + tərnak / [bətərna?] 'to ranch'
2. pekerjaan /pər+kərʃa+an/ [pəkərʃaʔan] 'work,
 occupation'
- pesertaan /pər+sərta+an/ [pəsərtaʔan] 'participation'
- peternakan /pər+tərnak+an/ [pətərnakən] 'ranch'
3. tekerjakan /tər+kərʃa+kan/ [təkərʃakan] 'managed to do'
- tesertakan /tər+sərta+kan/ [təsərtaʔkan] 'included/
 sent unintentionally'
- teterbangkan /tər+tərbaŋ+kan/ [tətərbaŋkan] 'managed
 to fly something'

Notice that the second syllable of the above stems always begins with a consonant. Although P-rule 1 has captured in a way the deletion of the final /r/ in /bər/, /pər/ and /tər/ before a trill, this phenomenon is also accounted for by P-rule 2 below.

P-rule: Trill deletion

$$(2) \begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \\ -\text{Cont} \end{bmatrix} \longrightarrow \emptyset / +\text{CV}_a \text{ ---- } ++ \left\{ \begin{array}{l} \begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \\ -\text{Con} \end{bmatrix} \\ \begin{array}{l} \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Back} \\ -\text{Round} \\ -\text{Low} \end{bmatrix} \begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \\ -\text{Cont} \end{bmatrix} \end{array} \right\} \begin{array}{l} \\ C \\ C \end{array} \right\} X$$

where CV_a stands for the first two segments of the prefixes /bər/, /pər/ and /tər/, C for any consonant other than /r/, and X for any sequence of segments beginning with a vowel.

The rule states that the final /r/ ([+Consonant, +Sonorant, -Nasal, -Continuant]) in the prefixes /bər/, /pər/ and /tər/ is deleted before stems beginning with a trill, or before stems whose first syllable begins with a consonant other than a trill followed by a central mid vowel (/ə/ - [-Consonant, +Syllabic, +Back, -Round, -Low]) and ends in a trill.

5.2 Glottal Stop Insertion, and Glottal Stop Realisation of /k/

5.2.1 Glottal Stop Insertion

It has been pointed out in Section 3.1 that BI allows only two vowels at the maximum to occur in a sequence within morphemes. We have also seen in Subsection 4.1.2 that sequences of two identical vowels are possible although they occur only in a small number of items of (mostly) non-Malay origin. This kind of sequences (i.e. sequences of two identical vowels) is not permitted on the phonetic level. In such case, a glottal stop ([ʔ]) is inserted between the two identical vowels. This constraint is true not only within morphemes but also across morpheme boundaries as illustrated by the following examples (5.3).

- (5.3) 1. / s a a t / [s a ʔ a t] 'time, moment'
 / t a a t / [t a ʔ a t] 'obedient'
 / m a a f / [m a ʔ a f, m a ʔ a p] 'sorry'
 / n a a s / [n a ʔ a s] 'unlucky day'
 / s u u n / [s u ʔ ʌ n] 'rice noodle'
2. / kə + əmpat / [kəʔəmpat] 'the fourth'
 / sə + ekor / [səʔ ekor] 'one (animal classifier)'

/ di + isap/ [diʔisap] 'to be smoked/sucked'

/ di + ikat/ [diʔikat] 'to be tied'

/ bača + an/ [bačaʔan] 'reading material'

Notice that the juxtaposed vowels in /sə + ekor/ above are not quite the same. They agree only on the features high, low and round (i.e. they both have the feature specifications [-High,-Low,-Round]).

The phenomenon discussed above can be formulated as follows.

P-rule: Glottal stop insertion.

$$(3) \quad \emptyset \text{ -----} \rightarrow \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ -\text{Voice} \\ -\text{Cont} \end{bmatrix} \quad / \quad \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \alpha \text{ High} \\ \beta \text{ Low} \\ \gamma \text{ Round} \end{bmatrix} (+) \text{ --- } \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \alpha \text{ High} \\ \beta \text{ Low} \\ \gamma \text{ Round} \end{bmatrix}$$

The rule says that a glottal stop ([ʔ] - [-Consonant, -Syllabic, -Voice, -Continuant]) must be inserted between two vowels which have the same specifications for the features high, low and round.

It should be noted however that in rapid speech, vowel sequences illustrated by examples (5.3:2) are often reduced into single vowels, but this kind of pronunciation is considered 'sub-standard'.

5.2.2 Glottal Stop Realisation of /k/

It has been argued in Sub-section 2.1.1 that the glottal stop ([ʔ]) is not necessary for the representation of morphemes on the phonological level. It was

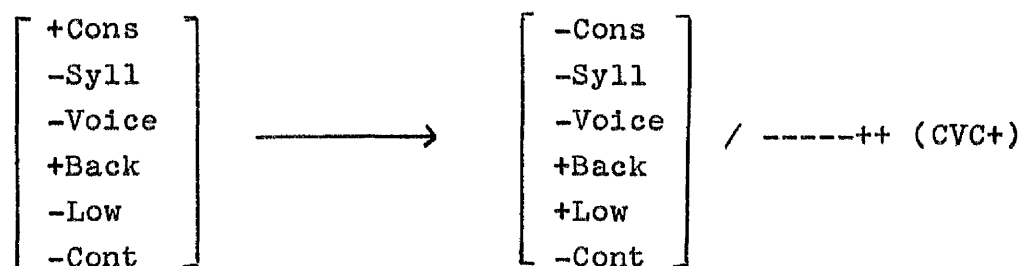
([k]) when it is followed by a vowel (cf. c-items). Notice that the sequence k-k (cf. 5.4:5b) may be realised as [ʔk] or [k]. (The latter realisation has been captured by P-rule 1 - degemination rule).

In addition to the environments discussed above, /k/ may also be realised as [ʔ] in morpheme medial position in a small number of loan items such as /laknat/ [laʔnat] 'curse', /makna/ [maʔna] 'implication, meaning', /yakni/ [yaʔni] 'namely', /rakyat/ [raʔyat] 'people' etc. (/k/ in morpheme-medial position is usually realised as [k] such as /ʔaksa/ [ʔaksa] 'judge', /laksana/ [laksana] 'like (adv)', /akrap/ [akrap] 'intimate', /iklim/ [iklim] 'climate' etc). The other type of exceptions to the regularity observed in a-items in examples (5.4) above, is the realisation of the underlying /k/ as a velar stop ([k]) rather than a glottal stop ([ʔ]) in morpheme-final position in a number of loan words, such as /pak/ [pak] 'package', /rak/ [rak] 'shelf', /lak/ [lak] 'to seal', /fanatik/ [fanatik] 'fanatic', /apotik/ [apotik] 'chemist' etc. Items containing /k/ in morpheme-medial position have to be marked '+P-rule 4' in the lexicon when /k/ is realised as [ʔ]. On the other hand, items ending in /k/ have to be marked '-P-rule 4' in the lexicon when /k/ is realised as [k] rather than [ʔ].

The following rule (P-rule 4) accounts for the realisation of /k/ as [ʔ] in morpheme-final position.

P-rule: Glottal stop realisation of /k/

(4)



where C stands for any consonant and V for any vowel. The rule says that /k/ ([+Consonant, -Syllabic, -Voice, +Back, -Low, -Continuant]) is phonetically realised as [ʔ] ([-Consonant, -Syllabic, -Voice, +Back, +Low, -Continuant]) in morpheme-final position. And when a morpheme ending in /k/ is followed by a suffix (CVC+) beginning with a consonant, the final /k/ may still be phonetically realised as a glottal stop. The realisation of /k/ in the latter environment is optional.

5.3 Deletion of /h/, Syllable Reduction, Voicing of /h/ and Place Adjustment of /h/

5.3.1 Deletion of /h/

Speakers of BI tend to drop the glottal fricative (/h/) in their speech, without the risk of being considered to be using sub-standard pronunciation, under certain circumstances. Many speakers tend to delete /h/ when this segment occurs in morpheme final position as illustrated by examples (5.5) below.

- (5.5) 1. /ləti h/ [ləti] 'tired'
 2. /basah/ [basa] 'wet'

3. / leleh / [lele] 'to trickle, melt'
4. / pənuh / [pənu] 'full'
5. / kasih / [kasi] 'to give, to love' etc.

When the above (stem) morphemes combine with suffixes beginning with consonants, the final /h/ of those stems tends to be deleted still as illustrated by examples (5.6) below. Notice that the final segment /h/ in /-kah/ 'interrogative suffix' and /-lah/ 'imperative/emphatic forming suffix' in the following examples also tends to be dropped in the same way as that of the stems cited above.

- (5.6) 1. / lətih + kah/ [lətika] '(are you) tired'
2. / basah + kan/ [basakan] 'to wet (causative)'
 3. / leleh + kan/ [lelekan] 'to trickle something'
 4. / pənuh + lah/ [pənula] '(it was) full'
 5. / kasih + pa/ [kasipa] 'his/her love' etc.

When the stems given in (5.5) above combine with suffixes beginning with vowels (i.e. /-i/ 'transitive/causative/locative forming suffix' or /-an/ '(abstract) noun forming suffix'), the final /h/ of those stems may tend to be dropped still, except when the preceding vowel (i.e. the vowel of the last syllable of the stem in question) is identical with the vowel immediately following the final /h/ (i.e. the vowel of the suffix in question). Thus /h/ in stem final position in examples (5.7) may optionally be deleted but not in examples (5.8).

- (5.7) 1. /kə + lətih + an/ [kəlætian] 'state of being tired'
2. /mən + basah + i/ [məmbasai] 'to wet (something)'
 3. / leleh + i/ [lelei] 'to trickle onto'

4. / pənuh + i / [pənuɪ] 'to fulfil'

5. / kasih + an/ [kasian] '(what a) pity'

The final /h/ of stems in the following examples is never deleted.

(5.8) 1. /kə + basah + an/ [kəbasahan] 'state of being wet'

2. / kasih + i / [kasihi] 'to love somebody'

3. / lābih + i / [lābihi] 'to increase, give more'

4. / kə + marah + an/[kəmarahan] 'angriness'

5. / kə + susah + an/[kəsusahan] 'sadness' etc.

Apart from the environments illustrated by examples (5.7) above, intervocalic /h/ within morphemes also tends to be dropped when it serves as the onset of the final syllable of morphemes, especially in verbs and adjectives under the following conditions:

- i. V_1 (preceding vowel) and V_2 (following vowel) are not identical;
- ii. The final syllable does not end in a liquid or trill or glide;
- iii. V_1 must be a low or a high vowel and V_2 must be respectively a high or a low vowel.

Intervocalic /h/ in the following examples (5.9) may optionally be deleted on the phonetic level. Notice that in the first four items below /h/ is preceded by a low vowel (/a/) and followed by a high vowel (i.e. /u/ or /i/), and in the last item /h/ is preceded by a high vowel (/i/) and followed by a low vowel (/a/).

(5.9) 1. / tahu/ [t a u] 'to know'

2. / sahut/ [s a u t] 'to respond'

3. / jahit / [ʃ a ɪ t] 'to sew'
4. / pahit / [p a ɪ t] 'bitter'
5. / lihat / [l i a t] 'to see' etc.

When the above morphemes (stems) combine with affixes, the glottal fricative (/h/) still tends to be deleted as shown by examples (5.10) below.

- (5.10) 1. /kə + tahu + an/ [kətauʷan] 'to be discovered/known'
2. /bər + sahut + an/ [bərsautan] 'to respond
(reciprocally)'
3. /pə + mən + jahit / [pəpʃaɪt] 'tailor'
4. / pahit + kah / [paɪtka] '(is it) bitter'
5. / lihat + lah / [liatla] 'have a look' etc.

At first sight one may be tempted to conclude that the deletion of /h/ in the above stems is conditioned by the presence of the dental/ alveolar stop (/t/) serving as the coda of the last syllable of those stems or by the absence of any consonant in the final syllable (cf.5.9:1) rather than the fact that the above stems are either verbs or adjectives. Items like /sahit/ [sahit] 'martyr', /wahit/ [wahɪt] 'one', /tahu/ [tahu] 'bean cake' etc. clearly refute such conclusion because /h/ in these items is never dropped. Generally speaking, intervocalic /h/ in nouns is never deleted.³ There are however three nouns

3. Some regional pronunciations (e.g. South Sumatra accent - see Halim, 1974:p.178) also tend to drop /h/ in nouns like /dahi/ 'forehead', /bahu/ 'shoulder' etc.

to my knowledge, containing /h/ in the last syllable where it tends to be dropped by most speakers using 'standard' pronunciation of BI. They are /tahun/ [taʔn] 'year', /tahi/ [tai] 'dirt', /pərahu/ [pərau] 'boat'.

In examples (5.9) we find no /h/ between /u/ and /a/ (cf. condition iii). The absence of items containing /h/ in that environment is fortuitous in the sense that there is no verb or adjective (to my knowledge) containing such sound sequence. There are a few nouns however which contain /h/ occurring between /u/ and /a/ such as /tuhan/ [tuhan] 'God', /luhak/ [luhaʔ] 'district' etc. The /h/ segment in such items is never deleted in BI 'Standard Pronunciation'.

The underlying /h/ in the following examples is never deleted because it is preceded by a mid vowel (cf. 5.11:1) or it occurs in morphemes ending in a liquid, trill or (palatal) glide (cf. 5.11:2).

- (5.11) 1. / səhat / [səhat] 'healthy'
 / dəham / [dəham] 'to cough'
 / loha / [loha] 'to say morning prayer'
2. / lahir / [lahir] 'born'
 / mahir / [mahir] 'fluent'
 / ʔahil / [ʔahil] 'ill-hearted, stupid'
 / lihay / [lihay] 'cunning' etc.

Excluding the three nouns mentioned above (/tahun/, /tahi/ and /pərahu/) which must be marked '+P-rule 5' in the lexicon, the deletion of /h/ in the environments illustrated by examples (5.5) through (5.10) above can be formulated as follows.

P-rule: Deletion of /h/ (optional)

$$(5) \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Low} \\ +\text{Cont} \end{bmatrix} \longrightarrow \emptyset / \left\{ \begin{array}{l} \langle V_a \rangle \text{-----} *+ \left\{ \begin{array}{l} \text{CVC}_o + \\ \langle V_b C_o \rangle \end{array} \right\} \\ \begin{bmatrix} \alpha\text{High} \\ -\alpha\text{Low} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \text{-----} \begin{bmatrix} -\alpha\text{High} \\ \alpha\text{Low} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \left(\begin{bmatrix} -\text{Syll} \\ \langle +\text{Son} \rangle \\ \langle +\text{Nasal} \rangle \end{bmatrix} \right) ++ \end{array} \right. \begin{array}{l} \text{Verb} \\ \text{Adj} \end{array}$$

where C stands for any consonants and V for any vowels. V_a and V_b are different.

The rule says that /h/ ([−Consonant, −Syllabic, +Low, +Continuant]) may optionally be deleted in the following environments:

- a) /h/ occurs in morpheme final position regardless of the suffix (in the case of stems) added to it to the extent that the /h/ segment is not, by the suffixation, surrounded by two identical vowels;
- b) /h/ occurs between two non-identical vowels in verbs and adjectives and serves as the onset of the final syllable of the items where the two vowels, regardless of their position with respect to the /h/ segment, have the feature specifications [+High, −Low] and [−High, +Low]. The rule does not apply to items ending in non-nasal sonorant consonantal (non-syllabic) segments.

5.3.2 Syllable Reduction

Closely related to the phenomena discussed in Sub-section 5.3.1 above is the case of intervocalic /h/ serving as the onset of the second syllable of polysyllabic

items (formatives). This intervocalic /h/ is usually deleted together with the preceding vowel, under the following conditions.

- i. The (polysyllabic) item contains no closed syllable.
- ii. The vowel of the first syllable of the item in question is /a/.

As a result of the deletion of intervocalic /h/ and /a/ (the preceding vowel), there are quite a number of doublets in BI, that is words which have two phonetic forms each - full and reduced forms, such as (5.12) below.

- (5.12)
1. / bahasa / [bahasa], [basa] 'language'
 2. / cahaya / [cahaya], [caya] 'light'
 3. / sahaja / [sahaja], [saja] 'just'
 4. / baharu / [baharu], [baru] 'new'
 5. / dahulu / [dahulu], [dulu] 'formerly, earlier'
 6. / dahina / [dahina], [dina] 'miserable'
 7. / bahagia/ [bahagia], [bagia] 'happy'
 8. / rahasia/ [rahasia], [rasia] 'secret' etc.

These doublets are already reflected in the current writing system. Thus along with the forms bahasa, cahaya, sahaja, baharu, dahulu, dahina, bahagia, and rahasia, etc. one also finds forms basa, caya, saja, baru, dulu, dina, bagia and rasia respectively.

The doublet phenomenon is so regular that it seems necessary to try to seek for a phonologically plausible explanation to it. Some pairs seem to be reasonably explainable on historical linguistic grounds. Thus the pair bahasa/basa 'language' (cf.5.12:1) for example,

can be ascribed to the fact that the variants are the products of two different developments of the same source namely Sanskrit *bhāsā* 'language' (see e.g. Halim, 1974:pp.28-29). Since the source item contains a sound sequence which does not occur in Malay (BI), it is natural that speakers of BI made some modifications to it. In making such modifications, the speakers seemed to be divided into two groups, and subsequently, two directions of development happened to the source item. The first direction or process needs four rules (not necessarily applied in the order given here) to yield the form bahasa, viz (1) vowel (in this case /ə/) insertion rule to break up the sequence [bh] because aspirated plosives do not occur in BI, (2) de-retroflexion rule to change the retroflex [s] into the lamino-alveolar [s], (3) vowel shortening rule to change [ǣ] (= IPA [a:]) into [a], and (4) vowel lowering rule to change [ə] (derived by the first rule above) into [a]. The process can be outlined as follows.

<u>Forms</u>	<u>Rules</u>
*bhāṣā	-
*bəhāṣā	Schwa insertion
*bəhāsā	De-retroflexion
*bəhasa	Vowel shortening
<u>bahasa</u> ([bahasa])	Vowel lowering

The second direction (process) requires three rules to yield the form basa, viz. (1) de-aspiration rule to change the aspirated [bh] into [b] because BI does not have

aspirated plosives, (2) de-retroflexion rule to change the retroflex [ʂ] into the lamino-alveolar [s], and (3) vowel shortening rule to change [a] into [a]. The process may be outlined as follows. (The rules might not apply in the order given here).

<u>Form</u>	<u>Rules</u>
*bhāṣā	-
*b ā ṣ ā	De-aspiration
*b ā s ā	De-retroflexion
<u>b a s a</u> ([b a s a])	Vowel shortening

A similar explanation will also be true with the pair cahaya/caya 'light' (derived from Sanskrit *chahya). The form cahaya may be described as developing from chahya through the following phases. (The rules might not apply in the order given below).

<u>Form</u>	<u>Rules</u>
*chahya	-
*cahya	De-aspiration
*caḥya	Vowel (schwa) insertion
<u>cahaya</u> ([čahaya])	Vowel lowering

And the form caya may be described as developing from chahya through the following phases. (Again, the rules might not apply in the order given below).

<u>Form</u>	<u>Rules</u>
*chahya	-
*cahya	De-aspiration
<u>caya</u> ([ç a y a])	/h/-deletion

However, this quasi-historical account does not seem to explain the rest of the pairs cited in examples (5.12) above and many others which are not Sanskrit borrowed items. We could perhaps assume that the syllable reduction process through /h/-deletion in these words occurred much later, i.e. after the borrowing of the Sanskrit items, and that it was by analogy with the Sanskrit forms that native speakers of BI began to reduce the syllables of polysyllabic items. It may be doubted whether this was the case.

Another possible explanation, which seems more acceptable because it accounts for both borrowed and native BI items may run as follows. First, under the widespread tendency to drop /h/, speakers of BI deleted the glottal fricative. For example, the item sahaja 'just' (cf. 5.12:3) through the /h/-deletion rule would become *saaja. Then, the two-identical-vowel sequence could be reduced by a further rule into a single vowel resulting in saja. (In the case of forms containing sequences of two non-identical vowels derived by the /h/-deletion rule such as *daulu, *daina (cf. 5.12:5,6) a rule deleting the first vowel of those sequences would be required). The vowel degemination (or vowel deletion) could be said to be subject to the fact that polysyllabic items (stems) are less common in BI.

In the present description, the syllable reduction phenomenon discussed above is treated as a single phonetic event in the sense that there is no separate rule (or part of a rule) that accounts for the vowel shortening/vowel

deletion described above. In other words, the syllable reduction is viewed as a synchronic process rather than a diachronic one.

It must be noted however that there are a few items which do not undergo the syllable reduction process although they meet the conditions pointed out above, such as dahaga [dahaga] 'thirsty', pahala [pahala] 'reward' etc. These items must be marked '-P-rule 6' in the lexicon. The syllable reduction process may be formulated as follows.
P-rule: Syllable reduction (optional).

(6) ++ C $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Low} \\ -\text{Cont} \end{bmatrix}$ V C V (C V) ++

1 2 3 4 5 6 7 8 9 10

-----> 1 2 Ø Ø 5 6 7 8 9 10

where C stands for any consonants and V for any vowels.

The rule says that the vowel of the first syllable and the onset of the second syllable of a polysyllabic item may be deleted under the following conditions.

- a. The vowel of the first syllable of the item is /a/
 ([-Consonant, +Syllabic, +Low]).
- b. The onset of the second syllable of the item is /h/
 ([-Consonant, -Syllabic, +Low, +Continuant]).
- c. The (polysyllabic) item contains no closed syllable
 (i.e. a syllable ends in a consonant).

5.3.3 Voicing of /h/

Many speakers of BI tend to pronounce intervocalic /h/ (when it is not deleted under the circumstances point out in the last two sub-sections) with vocal cords in vibration, as in examples (5.13) below.

- (5.13) 1. / pəhən / [pəhən, pəhən] 'tree'
 / leher / [lehɛr, lehɛr] 'neck'
 / ahət / [ahət, ahət] 'Sunday'
 / sihir / [sihɪr, sihɪr] 'black magic'
 / suhu / [suhu, suhu] 'temperature'
 / kəhəndak / [kəhəndaʔ, kəhəndaʔ] 'intention,will'
 2. / ləbih + i/ [ləbihi, ləbihi] 'to make more'
 / kasih + i/ [kasihi, kasihi] 'to love somebody'
 / tambah + an/ [tambahan, tambahan] 'addition'
 / per + rumah + an/ [pərumahan, pərumahan]
 'housing' etc.

The voicing of /h/ in intervocalic position illustrated by examples (5.13) above has no linguistic significance whatsoever in the sense that the feature voice for the glottal fricative (/h/) has no contrastive function. Nor does it indicate any particular speech varieties or dialects. Accordingly, P-rule 7 set up below has to be regarded as a low level rule with respect to the whole set of rules of BI phonology.

P-rule: Voicing of /h/ (optional).

(7)

$$[-\text{Voice}] \rightarrow [+Voice] / V \left[\begin{array}{l} \text{-----} \\ -\text{Cons} \\ -\text{Syll} \\ +\text{Low} \\ +\text{Cont} \end{array} \right] (+) V$$

where V stands for any vowels.

The rule says that /h/ ([-Consonant, -Syllabic, +Low, +Continuant, -Voice]) may become voiced in intervocalic position regardless of whether it is followed by a grammatical formative boundary (+) or not.

5.3.4 Place Adjustment of /h/.

By definition, the underlying /h/ is [+Low] because it is assumed to be a glottal sound produced by lowering the body of the tongue below the level it occupies in neutral position. Studies in phonetics however, show that /h/ displays perfect co-articulation with the vowel that follows it regardless of whether the vowel is [+Low] or [+High]. Thus Sweet writes "H is ... liable to have its character modified by the configuration of the mouth; and the position for the vowel which follows the H being generally assumed, or at least prepared, while the H is being formed, the H naturally assumes the character of that vowel." (see Henderson, 1971: p.154).⁴ This means that the specification of the glide /h/ as [+Low] is true on the phonetic level only when

4. This phonetic fact has made some phonologists object to the classification of /h/ as [+Low] (cf. Fant, 1973: p.181).

the /h/ occurs before /a/. Before other vowels the /h/ segment becomes [-Low]. More specifically, the glottal fricative becomes [-Low,+High] before high vowels and [-Low,-High] before mid vowels. This (universal) phenomenon can be formulated as follows.

P-rule: Place adjustment of /h/.

(8)

$$\begin{bmatrix} +\text{Low} \\ -\text{High} \end{bmatrix} \text{-----} \rightarrow \begin{bmatrix} -\text{Low} \\ \alpha\text{High} \end{bmatrix} / \begin{bmatrix} \text{-----} \\ \text{-----} \\ +\text{Cont} \\ -\text{Syll} \\ -\text{Cons} \end{bmatrix} \begin{bmatrix} -\text{Low} \\ \alpha\text{High} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix}$$

The rule says that /h/([-Consonant,-Syllabic,+Continuant,+Low,-High]) becomes [-Low] before non-low vowels. The /h/ segment and the following vowel must also agree on the feature high.

5.4. Naturalization Rules

In Sub-section 2.1.2, we saw four non-native BI consonants posited as underlying segments, viz. /f/, /z/, /ʃ/ and /x/, which have been introduced into the sound system of BI through loan words. Each of these sounds tends to be substituted with some other sound which occurs in native BI items. This does not mean that there is one-to-one correspondence between the loan sounds and the native substitutes. It has been pointed out in Sub-section 2.1.2 that a single 'native' sound may represent two or more 'foreign' sounds, or the other way round,

one 'foreign' sound being represented by two or more 'native' sounds. For this reason, it will be much clearer to account for the phonological processes involving each of the non-native consonants posited in Sub-section 2.1.2 above separately.

5.4.1 Naturalization of /f/.

The phonological consonant /f/ is usually realised phonetically as a voiceless bilabial stop ([p]) in most loan words. Many loan items containing the /f/ consonant have been well established to the extent that they no longer sound or look foreign, i.e. they are pronounced with [p] and spelt with the letter p, such as (5.14) below. Notice that items cited in (5.14:1) and (5.14:2) are borrowed from Arabic and Dutch (or English) respectively.

- (5.14) 1. pikir / fikir / [pikir, fikir] 'to think'
paham / faham / [paham, faham] 'to comprehend'
pasal / fasal / [pasal, fasal] 'chapter'
hapal / hafal / [hapal, hafal] 'to memorize'
sipat / sifat / [sipat, sifat] 'character'
tapsir / tafsir / [tapsir, tafsir] 'to interpret'
sarap, saraf / saraf / [sarap, saraf] 'nerves'
tarap, taraf / taraf / [tarap, taraf] 'stage'
arip, arif / arif / [arip, arif] 'wise, intelligent'
2. pabrik / fabrik / [pabri?, fabrik] 'manufacture'
pakansi / fakansi / [pakansi, fakansi] 'vacation'
sopir / sofir / [sopir, sofir] 'driver'
dipan / difan / [dipan, difan] 'divan'
tarip / tarif / [tarip, tarif] 'tariff'

aktif / aktif / [aktif, aktif] 'active'
pasif / pasif / [pasif, pasif] 'passive'
intensif / intensif/ [intensif,intensif]'intensive'
motif, motif/motif/ [motif, motif] 'motif'
foto, foto / foto / [foto, foto] 'photo' etc.

Despite the strong tendency to substitute [p] for [f] in loan words, the underlying /f/ in examples (5.15) below is more commonly realised as [f] on the phonetic level. This is because they are special vocabulary items which are used mainly by educated people who happen to be familiar with the source languages. Items of this type are borrowed, mostly from Western languages (i.e. English or Dutch).

(5.15) vak / f a k / [f a k] 'school subject'
vitamin / fitamin/ [fitamɪn] 'vitamine'
veto / feto / [f e t o] 'veto'
visa / f i s a / [f i s a] 'visa'
fakta / fakta / [fakta] 'facts'
faktor / faktor/ [faktor] 'factor'
fanatik /fanatik/ [fanatik] 'fanatic'
federasi /federasi/ [federasi]'federation'
vokal / fokal / [fokal] 'vocal sounds (vowels)'
variasi /fariasi / [fariasi] 'variation' etc.

The naturalization of /f/ discussed above may be referred to as a de-spirantization process. Since the de-spirantization process does not apply to items cited in (5.15) those items must be marked '-P-rule 9' in the lexicon.

P-rule: De-spirantization (Naturalization) of /f/ (optional).

- (9) [+Continuant] ----> [-Continuant] / $\left[\begin{array}{c} \text{-----} \\ +\text{Cons} \\ +\text{Ant} \\ -\text{Cor} \\ -\text{Voice} \end{array} \right]$

The rule says that a voiceless labial fricative ([+Continuant, +Consonant, +Anterior, -Coronal, -Voice]) may become a voiceless labial stop ([-Continuant, +Consonant, +Anterior, -Coronal, -Voice]).

5.4.2 Naturalization of /z/.

The underlying consonant /z/ may be phonetically realised as a voiceless lamino-alveolar fricative ([s]) or a voiced alveolo-palatal affricate ([ʃ]). In some loan words, the underlying /z/ is more commonly realised as [s] such as (5.16:1), and in some others, /z/ is more commonly realised as [ʃ] such as (5.16:2). This phenomenon has been reflected to some degree in the current writing system.

- (5.16) 1. azas, asas / azas / [azas, asas] 'principle'
jazat, jasat / Jazat/ [ʃazat, ʃasat] 'body'
ijazah, ijasah/iʃazah/[iʃazah, iʃasah] 'diploma'
lazim, lasim / lazim/ [lazɪm, lasɪm] 'common'
jenazah, jenasah/ʃənazah/[ʃənazah, ʃənasah] 'corpse'
2. zaman, jaman / zaman / [zaman, ʃaman] 'era'
zabur, jabur / zabur / [zabʊr, ʃabʊr] 'psalm'
zamrud, jamrud/ zamrut/[zamrʊt, ʃamrʊt] 'emerald'
zinah, jinah / zinah/ [zinah, ʃinah] 'adultery'

zakat, jakat / zakat / [zakat,ɟakat] 'money paid
to mosque'

It must be noted however that the underlying /z/ may also be realised (but less commonly) as [ɟ] in examples (5.16:1) and as [s] in examples (5.16:2) above. To indicate which of the two 'native' sounds is more commonly used as a substitute for [z], one can mark in the lexicon '+P-rule 10a' when [s] is a more common substitute for [z] as in (5.16:1) and '+P-rule 10b' when [ɟ] is a more common substitute for [z] as in (5.16:2) above. The rule that converts /z/ into [s] or [ɟ] on the phonetic level set up below has to be regarded as an optional rule.

P-rule: Naturalization of /z/ (optional)

(10) a. [+ Voice] -----> [-Voice] /

+Cons
-Son
+Cont
+Ant
+Cor
-Back

b.

+Ant
+Cor
+Cont

 ----->

-Ant
-Cor
-Cont

 /

+Cons
-Son
+Voice
-Back

The rule says that the underlying consonant /z/ ([+Consonant, -Sonorant, +Voice, +Continuant, +Anterior, +Coronal

-Back]) may phonetically be realised as [s] ([+Consonant, -Sonorant, -Voice, +Continuant, +Anterior, +Coronal, -Back]) or [ʃ] ([+Consonant, -Sonorant, +Voice, -Continuant, -Anterior, -Coronal, -Back]).

5.4.3 Naturalization of /š/

The underlying consonant /š/ is usually realised as a voiceless alveolar fricative ([s]) on the phonetic level by most speakers of BI. This strong tendency has also been reflected in the current writing system, such as (5.17).

(5.17) sah, syah / š a h / [sah, šah] 'legal'

sarat, syarat /šarat/ [sarat, šarat] 'requirements'

asik, asyik / ašik / [asi?, ašɪ?]'to be absorbed in'

insaf, insap, insyaf /iŋšaf/ [insap, insaf, iŋšaf] 'to realise'

masarakat, masyarakat /mašarakat/[masarakat, mašarakat] 'society' etc.

Items cited above are Arabic borrowed words. The naturalization of /š/ illustrated by the above examples may be termed a 'fronting' process and can be formalized as follows.

P-rule: Fronting (Naturalization) of /s/ (optional).

(11)
$$\begin{bmatrix} -\text{Ant} \\ -\text{Cor} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{Ant} \\ +\text{Cor} \end{bmatrix} / \begin{bmatrix} \text{-----} \\ \text{-----} \\ -\text{Voice} \\ +\text{Cont} \\ -\text{Back} \\ +\text{Cons} \end{bmatrix}$$

The rules say that the underlying /ʃ/ ([+Consonant, -Voice, +Continuant, -Back, -Anterior, -Coronal]) may phonetically be realised as [s] ([+Consonant, -Voice, +Continuant, -Back, +Anterior, +Coronal]).

5.4.4 Naturalization of /x/.

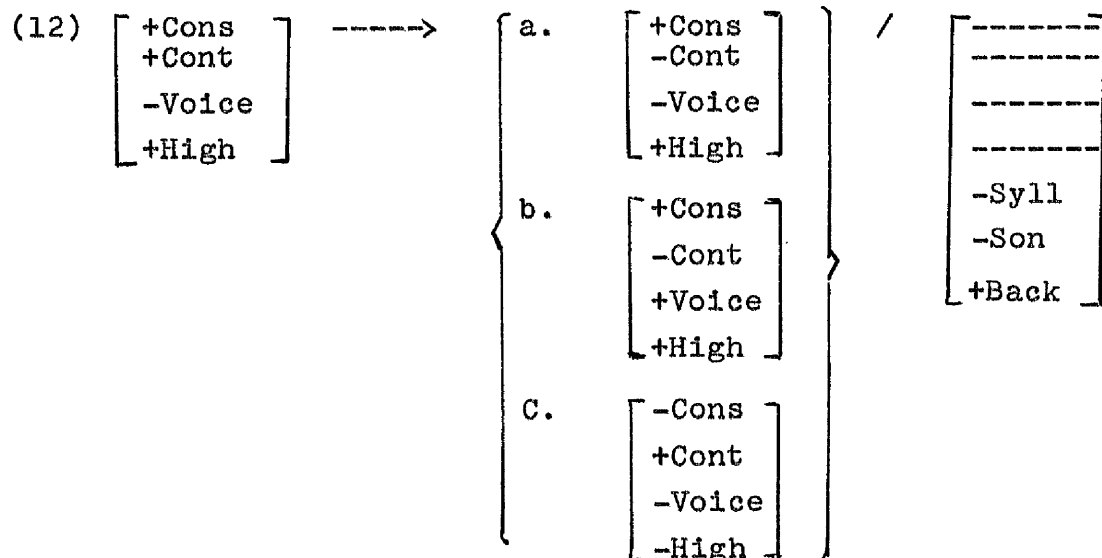
The underlying consonant /x/ may also be realised on the phonetic level as voiceless glottal fricative ([h]) or a voiceless velar stop ([k]) such as (5.18:1). In some cases, the underlying consonant /x/ may be phonetically realised as a voiceless glottal fricative ([h]) or a voiced velar stop ([g]) as in (5.18:2).

- (5.18) 1. khabar / xabar / [xabar, habar, kabar] 'news'
akhir / axir / [axir, ahir, akir] 'end'
khusus / xusus / [xusʷs, husʷs, kusʷs] 'special'
khilaf / xilaf / [xilaf, hilap, kilap] 'to be wrong'
khas / x a s / [xas, has, kas] 'typical'
ikhlas / ixlas / [ixlas, ihlas, iklas] 'sincere'
makhluk / maxluk/ [maxlʷ?, mahlʷ?, maklʷ?] 'human being'
teknik, tehnik /texnik/ [texnik, tehnik, tekník]
'technique'
2. Biologi / bioloxi/[bioloxi,biolohi,biologi] 'Biology'
Sosiologi/sosioloxi/[sosioloxi,sosiolohi,sosiologi]
'Sociology'
Geografi/xeografi/ [xeografi, heograpi, geograpi]
'Geography'
wagon, wahon/waxon/ [waxɔn, wahɔn, wagɔn] 'wagon'
reglemen /rexlemen/ [rexlemɛn, rehlemɛn, reglemɛn]
'regulation' etc.

Items cited in (5.18:1) are Arabic borrowed words (except the last item which is a Dutch/English borrowed word), and those cited in (5.18:2) are Dutch/English borrowed words.

The above examples show that /x/ may phonetically be realised as [h] in all cases, or as [k] in some cases (cf. 5.18:1) and as [g] in some other cases (cf. 5.18:2). In other words, the rule converting the underlying consonant /x/ into [k] (or [h]) must be prevented from applying to items cited in (5.18:2) and the like, and vice versa, the rule which converts the underlying consonant /x/ into [g] (or [h]) must be prevented from applying to items cited in (5.18:1) and the like. To solve this problem, items cited in (5.18:1) and the like have to be marked '+P-rule 12a' and those cited in (5.18:2) and the like have to be marked '+P-rule 12b' in the lexicon. Since the underlying consonant /x/ may also be realised as /x/ on the phonetic level, P-rule 12 set up below has to be regarded as an optional rule.

P-rule: Naturalization of /x/ (optional)



The rule says that the underlying consonant /x/ ([+Consonant, +Continuant, -Voice, +High, -Syllabic, -Sonorant, +Back]) may be phonetically realised as [k] ([+Consonant, -Continuant, -Voice, +High, -Syllabic, -Sonorant, +Back]) or [g] ([+Consonant, -Continuant, +Voice, +High, -Syllabic, -Sonorant, +Back]) or [h] ([-Consonant, +Continuant, -Voice, -High, -Syllabic, +Back]). This rule (P-rule 12c) must apply before P-rule 8.

5.5 Nasal Assimilation, Schwa Insertion and Consonant Deletion (Coalescence)

In Table 2 (see page 68), we saw twenty three phonological forms of affixes in BI. One of the affixes is /mən/ 'active voice verb prefix'. Here we are going to deal with a number of (morphological and phonological) processes related to the /mən/ prefix, that is - its phonetic alternations in various environments and phonological changes it causes in neighbouring morphemes or sounds. As suggested by the heading, here we will be concerned with the formulation of three kinds of phonological rules to account for the alternations in shape the /mən/ prefix undergoes in various environments and for phonological changes it causes in neighbouring morphemes or sounds. For this purpose, we need to examine two kinds of morphological environments in which /mən/ may occur, namely (1) /mən/ before stems, and (2) /mən/ intermediate between /pə/ 'noun forming prefix' and stems (cf. Section 3.4).

5.5.1 /mən/ Before Stems.

The /mən/ prefix is phonetically realised as [mə] before stems beginning with sonorant consonants and sonorant glides (cf. 5.20), as [məm] before stems beginning with labial obstruents (cf. 5.21), as [mən] before stems beginning with dental/alveolar obstruents (cf. 5.22), as [məɲ] before stems beginning with (palatal) affricate, alveolar and palatal fricative consonants (cf. 5.23) and as [məŋ] before stems beginning with vowels, velar and glottal obstruents (cf. 5.24). In other words, the final nasal segment in the /mən/ prefix is phonologically conditioned. (Note that nasals in stem final position do not undergo any modification when followed by suffixes, such as /makan + kah/ [makankah] 'eat?', /toloŋ + lah/ [toloŋlah] 'help (please)', /tanam + kan/ [tanamkan] 'plant (it)').

Before we examine further the allomorphs of the /mən/ prefix pointed above, the changes that occur in stems following the prefix, we need to examine another phenomenon which is typical to the /mən/ prefix, i.e. the tendency among BI speakers to insert a schwa immediately after the /mən/ prefix when it combines with monosyllabic stems. In such case, the /mən/ prefix will be realised as [məŋ] on the phonetic level as in examples (5.19) below. It must be pointed out however, that monosyllabic stems in BI are very limited in number, and most of them are loan items.

- (5.19) / mən + pak / [məŋəpak - məmak] 'to pack'
 / mən + tik / [məŋətik - mənik] 'to type'
 / mən + šah + kan/ [məŋəsahkan - mənahkan] 'to legalize'
 / mən + bel / [məŋəbəl - məmbəl] 'to ring a bell'
 / mən + čat / [məŋəčat - mənčat] 'to paint'
 / mən + lak / [məŋəlak - məlak] 'to seal'
 / mən + čap / [məŋəčap - mənčap] 'to stamp'
 / mən + bom / [məŋəbəm - məmbəm] 'to bomb'
 / mən + rem / [məŋərəm - mərəm] 'to brake'
 / mən + las / [məŋəlas - məlas] 'to weld'

The phonetic forms of /mən/ in the first set of the above derivations are identical (i.e. [məŋ]), whereas those which appear in the second set are not. We see furthermore, that the stem initial consonants /p/, /t/ and /s/ are deleted in the second set of the above derivations, but not in the first set. This means that the schwa insertion rule must apply before rules generating the forms appearing in the second set of the above derivations.

Notice that the schwa insertion process only occurs when /mən/ combines with monosyllabic items. It never occurs when the prefix combines with bisyllabic items. It never occurs when the prefix combines with bisyllabic or polysyllabic stems. Nor does it occur when monosyllabic stems combine with other prefixes. In the schwa deletion rule set up below (also in other rules), the form MEN is used rather than /mən/ because the form MEN is more attractive.

P-rule: Schwa Insertion (optional)

$$(13) \quad \emptyset \longrightarrow \left[\begin{array}{c} -\text{Cons} \\ +\text{Syll} \\ -\text{High} \\ -\text{Low} \\ +\text{Back} \\ -\text{Round} \end{array} \right] / \quad [\text{MEN}] \longrightarrow ++\text{CVC}++$$

where MEN = /mən/ 'active voice verb prefix'

++CVC++ = monosyllabic stems

The rule says that /ə/ ([−Consonant, +Syllabic, −High, −Low, +Back, −Round]) may be inserted between /mən/ and monosyllabic stems. (Note that monosyllabic stems to which the /mən/ prefix can be added are limited to those that have the structure CVC – see Section 3.1).

Examples (5.20) below illustrate that /mən/ is realised as [mə] on the phonetic level when it combines with stems beginning with sonorant consonants and (sonorant) glides.

- (5.20) 1. / mən + minta / [məminta] 'to ask (for)'
 / mən + makan / [məmakan] 'to eat'
 / mən + muay / [məmuay] 'to expand'
 / mən + nanti / [mənanti] 'to wait (for)'
 / mən + nilay / [mənilay] 'to evaluate'
 / mən + nani / [mənani] 'to sing'
 / mən + pala / [məpala] 'to blaze'
 / mən + nana / [mənana] 'to open one's mouth'
 / mən + nangur / [mənangər] 'to do nothing (jobless)'
2. / mən + lihat / [məliat] 'to see'

- / mən + lukis / [məlukis] 'to paint (picture)'
 / mən + lədak / [mələda?] 'to explode'
 / mən + rasa / [mərəsa] 'to feel'
 / mən + rusak / [mərusa?] 'to destroy'
 / mən + rəkam / [mərəkam] 'to record'
 3. / mən + wakil + i/ [məwakili] 'to represent'
 / mən + waris + i/ [məwarisi] 'to inherit'
 / mən + warta + kan/ [məwartakan] 'to broadcast'
 / mən + yakin + kan/ [məyakinkan] 'to convince'
 / mən + yayasan + kan/ [məyayasankan] 'to turn
 into an institution' etc.

Examples (5.21) below show that /mən/ is phonetically realised as [məm] before stems beginning with labial obstruents. Notice that stem-initial [p] (derived from /p/ or /f/ - see 5.21:2,3a) is deleted on the phonetic level. Prefix-initial [p] is not deleted on the phonetic level (see 5.21:4). Notice also that the stem-initial /f/ in (5.21:3b) is not deleted on the phonetic level because it is not realised as [p] (cf. P-rule 9).

- (5.21) 1. / mən + beli / [məmbeli] 'to buy'
 / mən + bača / [məmbača] 'to read'
 / mən + buat / [məmbuat] 'to make/do'
 2. / mən + pakay/ [məmakay] 'to use, to wear'
 / mən + pilih/ [məmilih] 'to choose, to vote'
 / mən + paksa/ [məmaksa] 'to force'
 3a./ mən + fikir/ [məmikir] 'to think'
 / mən + fihak/ [məmiha?] 'to take side'
 / mən + faham + i/ [məmahami] 'to comprehend'

3b./ mən + feto / [məmfeto] 'to veto'

/ mən + fitnah/ [məmfitnah] 'to slander'

/ mən + formil + kan/ [məmformilkan] 'to make it
formal'

4. / mən + pər + bəsar/ [məmpərbəsar] 'to enlarge'

/ mən + pər + tingi / [məmpərtiŋgi] 'to heighten'

/ mən + pər + paŋjaŋ/ [məmpərpəŋjaŋ] 'to lengthen' etc.

Examples (5.22) below show that /mən/ is phonetically realised as [mən] when it combines with stems beginning with dental stops. Notice that the underlying /t/ in stem-initial position in the following examples is deleted on the phonetic level. (Note that /mən/ is also realised as [mən] before /s/ in loan words - see examples (5.25)).

(5.22) 1. / mən + dapat / [məndapat] 'to get, to receive'

/ mən + didik / [məndidi?] 'to educate'

/ mən + daki / [məndaki] 'to climb (mountain)'

/ mən + dəŋar / [məndəŋar] 'to hear, to listen'

2. / mən + tutup / [mənutup] 'to close'

/ mən + tulis / [mənulis] 'to write'

/ mən + tətap / [mənətap] 'to settle'

/ mən + tonton/ [mənontən] 'to watch' etc.

Examples (5.23) below show that /mən/ is phonetically realised as [mən] when it combines with stems beginning with (palatal)affricate and alveolar/palatal fricative consonants. Notice that [s] (derived from /s/ or /ʃ/) is deleted on the phonetic level.

3. / mən + ganti / [mənɡanti] 'to change'
 / mən + gangu / [mənɡangu] 'to disturb'
 / mən + gigit / [mənɡigit] 'to bite'
4. / mən + kasih / [mənəsih] 'to give'
 / mən + kata + kan/ [mənatakan] 'to say'
 / mən + kuniŋ/ [mənuniŋ] 'to become yellow'
5. / mən + xabar + kan/ [mənabarkan, mənhabarkan,
 mənxabarkan] 'to inform, to send message'
 / mən + xusus + kan/ [mənususkan, mənhususkan,
 mənhususkan] 'to specialize, to concentrate
 on a particular subject'
 / mən + xawatir + kan/ [mənawatirkan, mənawatirkan,
 mənawatirkan] 'to worry' etc.

The facts illustrated by examples (5.20) through (5.24) above can be summed up as follows.

- i. The final nasal segment in the prefix /mən/ is deleted when the prefix combines with stems beginning with non-syllabic sonorant segments (i.e. trill, lateral and nasal consonants and voiced glides - cf. P-rule 14a).
- ii. The final nasal segments in the prefix /mən/ becomes homorganic with stem-initial obstruents (cf. P-rule 14b), and stem-initial vowels (cf. P-rule 14c). But when the /mən/ prefix occurs before stem-initial /s/, the final nasal in /mən/ is phonetically realised as a palatal nasal ([ɲ]) rather than as an alveolar nasal ([n]). This is true only when the stem-initial /s/ undergoes deletion (coalescence).

- iii. The final nasal segment in the prefix /mən/ and a stem-initial voiceless stop coalesce to a nasal which is homorganic with the stop in question; but when the prefix /mən/ occurs before stem-initial /s/, the final nasal in /mən/ and the stem-initial /s/ become a palatal nasal ([ɲ]).

It must be pointed out however that there is a strong tendency among speakers of BI to maintain stem-initial voiceless stops and the fricative /s/ on the phonetic level in many loan words such as

(5.25) / mən + tərjəmah + kan/ [məntərjəmahkan] 'translate'
(Arabic)

/ mən + koordinasi / [məŋkoʔordinasi] 'to co-ordinate'
(English)

/ mən + pəraaktek +kan/ [məmpəraaktekan, məmpraktekan]
'to practise' (English)

/ mən + supsidɪ / [mənsupsidi] 'to subsidize'
(English/Dutch)

/ mən + sensus / [mənsensəs] 'to conduct a census'
(English)

The dissimilation involved in the realisation of the final nasal in the prefix /mən/ as [ɲ] when fused with stem-initial /s/ (cf. 5.23:2) can be explained as follows. Since the final nasal segment in the prefix /mən/ before stem-initial nasals, and stem-initial voiceless consonants following /mən/ (except /ʃ/) are subject to deletion (or coalescence), there are quite a number of derivations which

are morphologically ambiguous because they are homophonic which, in turn, can cause additional problems in learning such as (5.26) below.

- (5.26) 1. memadat [məmadat] - a./mən+padat/'to become solid'
 b./mən+madat/'to smoke opium'
- memasak [məmasaʔ] - a./mən+pasak/'to fix bolt'
 b./ mən+masak/'to cook'
2. menobatkan [mənobatkan] - a./mən+tobat+kan/'to
 make someone repent'
 b. /mən+nobat+kan/'to inaugurate'
- menalam [mənalām] - a. /mən+talam/'to put in a tray'
 b. /mən+nalam/'to write a poem'
3. mengukur [məŋukur]- a. /mən+kukur/'to grate'
 b. /mən+ukur/'to measure'
- mengeram [məŋəram]- a. /mən+kəram/'to imprison'
 b. /mən+əram/'to hatch'
 c. /mən+ŋəram/'to grumble'
4. menyaring[məpariŋ]- a. /mən+sariŋ/'to sort out'
 b. /mən+pəriŋ/'to become louder'
- menyalang[məpalan]- a. /mən+salan/'to stab'
 b. /mən+palan/'to be wide open
 (eyes)'

The learner will certainly have difficulty in knowing whether the stems of the above derivations begin with voiceless obstruents or the corresponding homorganic nasals (or vowels in the case of the final nasal segment in /mən/ is realised as a velar - [ŋ]). From a learning point of view, a derivation which involves more alternatives (or ambiguities) is more difficult to learn than the one with less alternatives. The dissimilation which occurs when

when the final nasal segment in /mən/ and stem-initial /s/ coalesce to a palatal nasal ([ɲ]) may serve the purpose of preventing the occurrence of derivations with alternatives between stem-initials /n/, /t/ and /s/. But then, the learner has to face another kind of morphological ambiguity because both stem-initial /n/ and /s/ are phonetically realised as zero when preceded by the prefix /mən/. Speakers of BI minimize the learning problems by preserving stem-initial /ɣ/ on the phonetic level when preceded by /mən/. This may explain the exceptional character of /ɣ/ - the only voiceless (true) consonant in native BI which does not undergo coalescence (or deletion) when preceded by the /mən/ prefix.

The phonetic variants of the final nasal segment in /mən/ illustrated by examples (5.20) through (5.26) above can be formulated as follows.

P-rule: Nasal deletion and assimilation.

$$\begin{array}{l}
 (14) \quad \left[\begin{array}{c} +\text{Cons} \\ +\text{Nasal} \\ +\text{Ant} \\ +\text{Cor} \end{array} \right] \text{ ----} \rightarrow \left\{ \begin{array}{l} \text{a. } \emptyset / \text{ ME ----} + \left[\begin{array}{c} -\text{Syll} \\ +\text{Son} \\ +\text{Seg} \end{array} \right] \\ \\ \text{b. } \left[\begin{array}{c} \alpha \text{ Ant} \\ \beta \text{ Cor} \\ \gamma \text{ Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] / \text{ ME ----} + \left[\begin{array}{c} \alpha \text{ Ant} \\ \beta \text{ Cor} \\ \gamma \text{ Back} \\ -\text{Syll} \\ -\text{Son} \\ +\text{Seg} \end{array} \right] \\ \\ \text{c. } \left[\begin{array}{c} -\text{Ant} \\ -\text{Cor} \\ +\text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] / \text{ ME ----} + \left[\begin{array}{c} -\text{Ant} \\ -\text{Cor} \\ +\text{Syll} \\ -\text{Cons} \end{array} \right] \end{array} \right\}
 \end{array}$$

where ME = the first two segments of /mən/ 'active

voice verb prefix

Seg = segment (i.e. consonant or glide)

The rule says that:

- a) the final nasal segment in the prefix /mən/ is deleted before stem-initial non-syllabic sonorant segments ([−Syllabic,+Sonorant,+Segment]);
 - b) the final nasal segment in the prefix /mən/ becomes homorganic with stem-initial obstruent segments ([−Syllabic,−Sonorant,+Segment]).
 - c) the final nasal segment in the prefix /mən/ is phonetically realised as a velar nasal ([+Consonant,+Nasal,+Back,−Coronal,−Anterior]) before stem-initial vowels ([−Consonant,+Syllabic,−Coronal,−Anterior]).
- Thus the final nasal segment in /mən/ may be regarded as homorganic with a stem-initial vowel to the degree that both are [−Anterior,−Coronal].

Notice that stem-initial voiceless consonants other than /ç/ (and also loan sounds - [f], [ʃ], [x]) in the above examples (cf. 5.21:2; 5.22:2; 5.23:2; 5.24:4) are deleted when preceded by /mən/. The deletion of stem-initial voiceless consonants also occurs in the second part of reduplicated forms as in (5.27:1) below.

- (5.27) 1. /mən + pilih + pilih/ [məmilih milih] 'to be selective'
- /mən + potonɔ̃ + potonɔ̃/ [məmotɔ̃ motɔ̃] 'to cut repeatedly'
- /mən + tari + tari/ [mənarɪ narɪ] 'to dance (because of excitement)'
- /mən + tulis + tulis/ [mənulɪs nulɪs] 'to write

without any definite purpose'

/mən + karaŋ + karaŋ/ [məŋaraŋ ŋaraŋ] 'to make up'

/mən + kata + kata + i/ [məŋata ŋatai] 'to speak
ill about someone'

/mən + sapu + sapu/ [məŋapu ŋapu] 'to sweep (just
for the sake of sweeping'

/mən + sia + sia + kan/ [məŋsia ŋiakan] 'to waste'

2. /mən + bača + bača/ [məmbača bača] 'to read without
serious attention'

/mən + dəsak + dəsak/ [məndəsə? dəsə?] 'to keep
insisting'

/mən + geleŋ + geleŋ + kan/ [məŋgeleŋ geleŋkan] 'to
shake one's head (repeatedly)'

/mən + čari + čari/ [məŋčari čari] 'to keep searching'

/mən + ʃərit + ʃərit/ [məŋʃərit ʃərit] 'to keep shouting'

/mən + halaŋ + halaŋ + i/ [məŋhalaŋ halaŋi] 'to keep
hindering'

/mən + əlu + əlu + kan/ [məŋəlu əlukan] 'to welcome
with decorations, to praise'

/mən + lihat + lihat/ [məliat liat] 'to have a look' etc.

Note that stem-initial sounds in (5.27:2) above are not affected by /mən/ in the second part of the reduplicated forms.

The coalescence which occurs when /mən/ is followed by a stem-initial voiceless obstruent illustrated by examples (5.21:2; 5.22:2, 5.23:2, 5.24:4, 5.25:1 and 5.27:1) above can be formulated as follows.

P-rule: Consonant coalescence.

$$\begin{array}{ccccccc}
 (15) & + & \text{ME} & \left[\begin{array}{c} +\text{Ant} \\ +\text{Cor} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] & + & \left\{ \begin{array}{l} \text{a.} \left[\begin{array}{c} +\text{Cons} \\ -\text{Voice} \\ -\text{Cont} \\ \alpha \text{ Ant} \\ \beta \text{ Cor} \\ -\alpha \text{ Back} \end{array} \right] \\ \text{b.} \left[\begin{array}{c} +\text{Cons} \\ -\text{Voice} \\ +\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{array} \right] \end{array} \right\} & \text{X} & ++ & (5 \ 6) & (\text{SUFFIX}) \\
 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & (5 \ 6) & (8)
 \end{array}$$

$$\begin{array}{ccccccc}
 \text{---->} & 1 & 2 & \left\{ \begin{array}{l} \text{c.} \left[\begin{array}{c} \alpha \text{ Ant} \\ \beta \text{ Cor} \\ -\alpha \text{ Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \\ \text{d.} \left[\begin{array}{c} -\text{Ant} \\ -\text{Cor} \\ -\text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \end{array} \right\} & 6 & 7 & (& \left\{ \begin{array}{l} \text{e.} \left[\begin{array}{c} \alpha \text{ Ant} \\ \beta \text{ Cor} \\ -\alpha \text{ Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \\ \text{f.} \left[\begin{array}{c} -\text{Ant} \\ -\text{Cor} \\ -\text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \end{array} \right\} & 6 &) & (8) \\
 & & & (3 \ 4 \ 5) & & & (3 \ 4 \ 5) & & &
 \end{array}$$

Condition: If a, then c and e; if b, then d and f

ME = the first two segments of /mən/

X = sequence of segments beginning with a vowel

The rule says that the final nasal segment in the prefix /mən/ and a stem-initial voiceless stop ([+Consonant, -Voice, -Continuant]) coalesce to a nasal which is homorganic

with the stem-initial stop. Notice that the features anterior and back which require reversed specifications block the rule from applying to /ɣ/ ([+Consonant,-Voice,-Continuant,-Anterior,-Back]). And when the prefix /mən/ occurs before stem-initial /s/ ([+Consonant,-Voice,+Continuant,+Anterior,+Coronal]), the final segment in /mən/ and /s/ will become a palatal nasal ([ɲ] - [+Consonant,+Nasal,-Anterior,-Coronal,-Back]). The rule states furthermore that when the stem following the /mən/ prefix is reduplicated, the second part of the reduplicated form also undergo the coalescence process. Obviously, the rule must be allowed to apply to the output of naturalization rules set up in Section 5.4, so that phonetic forms illustrated by examples (5.21:3a, 5.23:3 and 5.24:5) may be correctly derived. Meanwhile, loan items such as (5.25) which do not undergo coalescence when preceded by the /mən/ prefix have to be marked '-P-rule 15' in the lexicon.

5.5.2 /mən/ Intermediate Between /pə/ and Stems.

It was argued in Section 3.4 that it is desirable and phonologically plausible to postulate the prefix /mən/ in the underlying representations of words (derived nouns) like pengerja [pəŋərʃa] 'executor of a job', penyerta [pəpərta] 'a company (friend)', pendagang [pəndagan] '(non-professional) trader', pendidikan [pəndidikan] 'education', penilaian [pənilayan] 'evaluation', pemuaian [pəmuayan] 'expansion, extension' etc. The main concern in this

/pə + mən + paŋi/ [pəpaŋi] 'singer (non-professional)'

/pə + mən + warta/ [pəwarta] 'the person who informed'

/pə + mən + lukis/ [pəlukis] 'painter'

/pə + mən + rantaw/ [pərantaw] 'traveller' etc.

The processes involving the final nasal in /mən/ and stem-initial sounds, namely nasal assimilation (cf. 5.28:1), consonant coalescence (cf. 5.28:2) and nasal deletion (cf. 5.28:3) have been captured by rules set up in Sub-section 5.5.1. P-rule 16 set up below accounts for the deletion of the first two segments of the prefix /mən/ intermediate between /pə/ and stems illustrated by the above examples (5.28).

P-rule: Deletion of the first two segments of /mən/.

(16) [ME] -----> Ø / + PE + [----] $\left[\begin{array}{c} +\text{Cons} \\ +\text{Nasal} \\ +\text{Ant} \\ +\text{Cor} \end{array} \right]$ + STEM (SUFFIX)

where ME = the first two segments of the prefix /mən/

PE = the prefix /pə/

The rule says that the first two segments of the prefix /mən/ are deleted when the prefix is postulated between /pə/ and stems.

5.6 Vowel: Laxing, Retraction, Deletion, Nasalization;

Lowering and Coalescence

5.6.1 Vowel Laxing.

In BI vowels usually become lax when they occur in final closed syllables - i.e. they are relatively more open and produced with less articulatory effort compared

with the corresponding tense vowels. Chomsky and Halle (1968: p.324) write:

"Tense sounds are produced with a deliberate, accurate, maximally distinct gesture that involves considerable muscular effort; nontense sounds are produced rapidly and somewhat indistinctly. In tense sounds, both vowels and consonants, the period during which the articulatory organs maintain the appropriate configuration is relatively long, while in nontense sounds the entire gesture is executed in a somewhat superficial manner."

As to the difference in the degree of openness between a tense vowel and the corresponding lax vowel, Chomsky and Halle (1968) write as follows.

"It has been observed, for instance, that the tongue constriction in tense [i] is narrower than that in lax [ɪ]. This difference in tongue height is superficially rather similar to that observed between high [i] and nonhigh [e]. The mechanism involved, however, is quite different in the two cases..." (p.324).

The symbols [ɪ], [ɛ], [ʊ] and [ɔ] are used in this thesis to represent, respectively, the lax versions of the tense vowels [i], [e], [u] and [o]. Examples (5.29) below show that tense vowels become lax in final closed syllables.

- (5.29) 1. a. /didik/ [didɪ?] 'to educate'
 b. /didik + an/ [didikan] 'the result of educating'
2. a. /pimpin/ [pimpɪn] 'to lead'
 b. /pimpin + an/ [pimpinan] 'superior, act of leading'
3. a. /pendek/ [pendɛ?] 'short'
 b. /kə + pendek + an/ [kəpendekan] 'abbreviation'

4. a. /jeŋer/ [jeŋer] 'to stand/sit in a row'
 b. /jeŋer + kan/ [jeŋerkan] 'to place in a row'
5. a. /duduk/ [dudəʔ] 'to sit'
 b. /duduk + i/ [duduki] 'to sit on (something)'
6. a. /minum/ [minəm] 'to drink'
 b. /minum + an/ [minuman] 'drink'
7. a. /tonton/ [tonton] 'to watch'
 b. /tonton + an/ [tontonan] 'entertainment'
8. a. /belok/ [beləʔ] 'to turn'
 b. /belok + an/ [belokan] 'bend, turn'

Notice that in the above examples, the last vowels of stems (a-items) are phonetically realised as lax vowels and as tense vowels in b-items because of the presence of the suffixes. The vowel laxing rule set up below applies to all the six vowels set forth in Section 2.2, except /a/ and /ə/ which are already lax.

P-rule: Vowel laxing.

$$(17) \quad \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix} \quad \text{-----} \rightarrow \quad [-\text{Tense}] / \quad [-\text{-----}] \quad \text{C} \quad ++$$

where C stands for any consonants.

The rule says that vowels become lax ([-Tense]) when they occur in final closed syllables.

5.6.2 Vowel Retraction

The front mid vowel /e/ is usually realised phonetically as [ə] in non-final syllables when it does not carry stress, such as (5.30).

P-rule: Vowel retraction (optional)

$$(18) \quad [-\text{Back}] \rightarrow [+ \text{Back}] \quad / \quad X \left[\begin{array}{l} \text{----} \\ -\text{High} \\ -\text{Low} \\ -\text{Round} \\ +\text{Syll} \\ -\text{Cons} \\ -\text{Stress} \end{array} \right] C_0^2 VC_0 VC_0 (C_0 VC_0)^{++}$$

where X stands for any segment sequence or null.

The rule says that unstressed /e/ ([-Consonant, +Syllabic, -Back, -High, -Low, -Round, -Stress]) before penultimate syllable may phonetically be realised as [ə] ([-Consonant, +Syllabic, -Low, -High, +Back, -Round]).

5.6.3 Schwa Deletion

It has been pointed out in Section 3.1 that consonant clusters in initial position and sequences of three or more consonants in medial position are prevented on the phonological level by inserting a schwa (/ə/) in the underlying representations of a number of loan items, recently borrowed either from English or Dutch, to break up such 'inadmissible' sequences. To derive the correct (or common) phonetic forms of these loan items, such as (5.31), we shall need a schwa deletion rule.

(5.31) 1. /pəraktek/ [praktək, pəraktək] 'to practise,
practice'

/pəroklamasi/ [proklamasi, pəroklamasi] 'proclamation'

/kəlinik/ [klinɪk, kəlinɪk] 'clinic'

/kəleim/ [kleɪm, kəleɪm] 'claim'

/sətruktʊr/ [struktʊr] 'structure'

2. /industəri/ [industri, industəri] 'industry'
 /insətruksi/ [instruksi] 'instruction'
 /insəpeksi/ [inspeksi] 'inspection'
 /kənsətruksi/ [konstruksi] 'construction'
 /insətalasi/ [instalasi] 'installation' etc.

Notice that the postulated /ə/ in some of the above items is never realised on the phonetic level. Those items must be marked '+P-rule 19' in the lexicon. The schwa deletion rule also accounts for the phonetic forms of long established loan items (Sanskrit borrowed items) such as (5.32) below.

- (5.32) /putəra/ [putəra, putra] 'boy, son'
 /putəri/ [putəri, putri] 'girl, daughter'
 /sastəra/ [sastəra, sastra] 'literature'
 /sutəra/ [sutəra, sutra] 'silk'
 /səʃahtəra/ [səʃahtəra, səʃahtra] 'prosperous' etc.

The main reason for choosing the first set of the phonetic forms of the above items as their underlying forms is, apart from the positive condition enumerated in Section 3.1, to have a simpler description because we can then do away with schwa insertion rule. One may wish to take the opposite position, that is he may wish to do away with schwa deletion rule. But this approach will certainly fail to account for schwa deletion which occurs in native BI items in rapid speech, such as (5.33) below.

- (5.33) /bəlum/ [bələm, bləm] 'not yet'
 /təraŋ/ [təraŋ, traŋ] 'bright, light'
 /səlamat/ [səlamat, slamat] 'safe'
 /kəpada/ [kəpada, kpada] 'to'
 /ənəm/ [ənəm, nəm] 'six'

The schwa deletion process illustrated by examples (5.31) through (5.33) above can be formulated as follows.

P-rule: Schwa deletion (optional)

$$(19) \quad \left[\begin{array}{l} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \\ +\text{Back} \\ -\text{Round} \end{array} \right] \text{-----} \rightarrow \emptyset / X \text{ [-----] } C_O^2 V C_O (V C_O) ++$$

where X stands for any sequence of segments or null, C for any consonant and V for any vowel.

The rule says that /ə/ ([-Consonant,+Syllabic,-Low,+Back,-Round]) may be deleted in non-final syllables. This rule also applies to the output of P-rule 18.

5.6.4 Vowel Nasalization

Another phenomenon concerning vowels that can be observed in the speech of many speakers of BI is the nasalization of vowels. The following examples show that when a vowel is preceded by a nasal consonant, this vowel will tend to be nasalized.

- (5.34) /makan/ [m ã k a n] 'to eat'
 /enak/ [e n ã ?] 'delicious'
 /anin/ [a ŋ ã n] 'wind'
 /pawa/ [p ã w a] 'soul'
 /main/ [m ã i n] 'to play' etc.

Halim (1974) claims that the nasalization is often carried out across a syllable when the following syllable begins with a vowel or a glide. The data however

provide no support to this claim. It is true that both vowels in /maaf/ 'to be sorry' are nasalized by some speakers but such nasalization does not seem to be solely conditioned by the preceding nasal. Examples (5.35) below show that the sequence -aa- in Arabic borrowed words tends to be nasalized by many speakers irrespective of the preceding consonant.

- (5.35) /saat/ [s ă ? ă t] 'moment'
 /taat/ [t ă ? ă t] 'obedient'
 /manfaat/ [manfă?ăt] 'advantage, use'
 /safaat/ [safă?ăt] 'intercession'
 /naas/ [n ă ? ă s] 'unlucky day' etc.

Note that the nasalization of vowels discussed above has no linguistic significance and therefore P-rule 20 set up below has to be regarded as a low level rule with respect to the whole set of BI phonology rules.

P-rule: Vowel nasalization (optional)

- (20) [-Nasal] \rightarrow [+Nasal] / X $\left\{ \begin{array}{l} \left[\begin{array}{l} +\text{Cons} \\ +\text{Nasal} \end{array} \right] \left[\begin{array}{l} \text{-----} \\ +\text{Syll} \\ -\text{Cons} \end{array} \right] \\ \left[\begin{array}{l} \text{-----} \\ +\text{Syll} \\ -\text{Cons} \\ +\text{Low} \end{array} \right] \left[\begin{array}{l} \text{-----} \\ +\text{Syll} \\ -\text{Cons} \\ +\text{Low} \end{array} \right] \end{array} \right\} \text{ Y}$
- In Arabic words

where both X and Y stand for any sequence of segments.

The rule says that vowels ([-Consonant, +Syllabic, -Nasal]) are (optionally) nasalized when preceded by nasals.

The vowel sequence -aa- in Arabic borrowed words also tends to be nasalized.

5.6.5 Vowel Lowering

In Sub-section 5.3.2 we saw that there are a number of doublets resulting from syllable reduction (i.e. the deletion of /h/ together with the preceding vowel). There is another type of doublets in BI where certain vowels occur in ^{free}variation in certain words. The types of vowels that may occur in free variation are (a) front vowels ([i] and [e]) as in (5.36:1), (b) rounded back vowels ([u] and [o]) as in (5.36:2) and (c) central vowels ([ə] and [a]) as in (5.36:3)

- (5.36) 1. /sənin/ [sənɪn - sənən] 'Monday'
 /b i a/ [b i a - b e a] 'tax'
 /liwat/ [liwat - lewat] 'to pass (by)'
 /peniŋ/ [penɪŋ - penɛŋ] '(animal) license batch'
 /apotik/ [apotɪk - apotɛk] 'chemist'
2. /kantun/ [kantəŋ - kantɔŋ] 'pocket'
 /luban/ [luban - loban] 'hole'
 /g u a/ [g u a - g o a] 'cave'
 /rubah/ [rubah - robah] 'to alter'
 /pulisi/ [pulisi - polisi] 'policeman'
3. /səram/ [səram - sɛram] 'frightening'
 /pintər/ [pintər - pintar] 'clever'
 /tabas/ [tabas - tabas] 'to cut off (grass, trees)'
 /taras/ [taras - taras] 'pith'
 /təntəra/ [təntəra - təntara] 'army' etc.

Since the free variability of the above pairs of vowels is limited to a number of items, we need to mark these items and the like '+P-rule 21' in the lexicon, to indicate that P-rule 21 set up below applies to them.

P-rule: Vowel lowering (optional)

- (21) a. $[+High] \rightarrow [-High] / \left[\begin{array}{c} \text{-----} \\ -Low \\ Round \\ Back \\ +Syll \\ -Cons \end{array} \right]$ In a number of items
- b. $[-Low] \rightarrow [+Low] / \left[\begin{array}{c} \text{-----} \\ -High \\ +Back \\ -Round \\ +Syll \\ -Cons \end{array} \right]$ In a number of items

The rule says that (a) high vowels may become non-high in a number of items, and (b) the central mid vowel /ə/ ([-Consonant, +Syllabic, -Low, -High, +Back, -Round]) may become low ([a] - [-Consonant, +Syllabic, +Low, -High, +Back, -Round]) in a number of items.

5.6.6 Vowel Coalescence

There is still another type of doublets in BI which results from the coalescence of a low vowel (/a/) and a high back vowel (/u/) into a back mid vowel ([o]) in a number of polysyllabic loan words such as the following.

5.7 Glide Insertion and Desyllabication

5.7.1 Glide Insertion

We saw in Sub-section 5.2.1 that a glottal stop is inserted to break up sequences of two identical vowels on the phonetic level. In addition to that, speakers of BI also tend to insert a glide to break up a sequence of a high vowel followed by another vowel. This inserted glide always agrees on the feature roundness with the first (high) vowel of the sequence in question. Thus a vowel sequence beginning with /i/ will tend to be broken up on the phonetic level by inserting the corresponding (voiced) non-round glide [y] as in (5.38:1). And a vowel sequence beginning with /u/ will tend to be broken up on the phonetic level by inserting the corresponding (voiced) round glide [w] as in (5.38:2). Recall the discussion in Sub-section 4.1.2 that vowel sequences ending in a mid vowel are very rare. Most of the examples given below contain vowel sequences ending in a low or high vowel.

- (5.38) 1. /siap/ [siap - siyap] 'ready'
 / tiap/ [tiap - tiyap] 'every, each'
 /ɕium/ [ɕiɔm - ɕiyɔm] 'to kiss, to smell'
 /tiup/ [tiɔp - tiyɔp] 'to blow'
 /biola/ [biola- biyola] 'violin'
 /hieraki/ [hieraki-hiyeraki] 'hierarchy'
2. /buat/ [buat - buwat] 'to do, to make'
 /d u a/ [d u a - duwa] 'two'
 /u a ŋ/ [u a ŋ - uwaŋ] 'money'

- /sosiologi/ [sosiologi - sosiologi] 'Sociology'
 /hierarki/ [hierarki - hierarki] 'hierarchy'
2. /suatu/ [suatu - swatu] 'one, something'
 /suasta/ [suasta - swasta] 'private (institution)'
 /keluarga/ [keluarga - kəlwarga] 'family, relative'
 /kuitansi/ [kuitansi - kwitansi] 'receipt'
 /kualitas/ [kualitét - kwalitét] 'quality'
 /kuintal/ [kuintal - kwintal] '100 Kg (unit)'
- (5.40) /u a ŋ/ [u a ŋ - w a ŋ] 'money'
 /u a k/ [u a ? - w a ?] 'uncle, aunt'
 /u a p/ [u a p - w a p] 'steam'
 /i a/ [i a - y a] 'to say yes'
 /iuran/ [iuran - yuran] 'contribution' etc.

Examples (5.39) suggest that 'desyllabication' (i.e. a process whereby a syllabic segment (vowel) becomes non-syllabic on the phonetic level) is conditioned by the absence of stress on those high vowels. This implies that stress placement rules must apply before the desyllabication rule. Examples (5.40) however do not satisfy such condition. Nor do examples (5.41) below.

- (5.41) /suria/ [suria - surya] 'the sun'
 /dunia/ [dunia - dunya] 'world'
 /mulia/ [mulia - mulya] 'glorious'
 /karunia/ [karunia - karunya] 'gift (from God)'
 /karia/ [karia - karya] 'work'
 /manusia/ [manusia - manusya] 'human being' etc.

Notice that stress in the above pairs of alternants falls on the second last vowel. This clearly suggests

that the stress placement rules must apply to the output of the desyllabication rule set up below.

Some of the pairs of alternants cited above have been reflected in the writing system in the sense that some of the above items have two equally-acceptable orthographic forms such as uang/wang 'money', ia/ya 'to say yes', uak/wak 'uncle, aunt', iuran/yuran 'contribution (money)', suria/surya 'the sun', kuitansi/kwitansi 'receipt', kualitet/kwalitet 'quality' etc. For this reason, the phenomenon illustrated by examples (5.39) through (5.41) above is viewed as a desyllabication process rather than glide insertion and vowel deletion processes. The desyllabication phenomenon may be formulated as follows.

P-rule: Desyllabication (optional)

$$(24) \quad [+Syll] \rightarrow [-Syll] \quad \left/ \begin{array}{l} \langle C \rangle_a \\ \left\{ \begin{array}{l} CVC \\ ++ \end{array} \right\} \end{array} \right. \left[\begin{array}{cc} \begin{array}{c} \text{----} \\ -Cons \\ +High \\ \alpha Round \end{array} & \begin{array}{c} -Cons \\ +Syll \\ \langle +High \rangle_c \\ \alpha Round_d \end{array} \end{array} \right] \begin{array}{c} \langle CV \rangle_b \\ X \end{array}$$

Conditions: If a then b; if c then d

C stands for any consonant, V for any vowel and X may be null or non-null.

The rule says that a high vowel may optionally become a glide (non-syllabic) when followed by another vowel in polysyllabic words or in (polysyllabic and bisyllabic) words beginning with a high vowel. The feature round for the first and second vowels must have reversed specifications if the second vowel is [+High].

5.8 Vowel Dissimilation

It has been stated in Chapter 3 that in BI a word can be constructed by means of reduplication of a stem. By definition, the underlying form of a word constructed by reduplication consists of two same parts. In most cases, both parts of a reduplicated form are also identical on the phonetic level. There are however a number of words constructed by means of reduplication of stems whose phonetic forms may not consist of two identical parts each because one of them may undergo a vowel change. Examples (5.42) below show that when the last syllable of a stem contains a high vowel (cf. 5.42:1-5) or mid vowel (cf. 5.42:6) then this vowel will be phonetically realised as a low vowel ([a]) in the first part of a reduplication; meanwhile when the second last syllable contains a low vowel (/a/), this vowel will be phonetically realised as a mid back vowel ([o]) in the first part of the reduplication (cf. 5.42:1-3).

- (5.42) 1. /balik + balik/[bola? balɪ?] 'to and fro'
 2. /ganti + ganti/[gonta ganti] 'continuously changing'
 3. /pantiŋ+pantiŋ/[pontaŋ pantiŋ] 'to run as fast
 as one could'
 4. /səliŋ + səliŋ/[səlaŋ səliŋ] 'to alternate'
 5. /dəsus + dəsus/[dəsas dəsəs] 'rumour'
 6. /čoret + čoret/[čorat čorɛt] 'scratches' etc.

Examples (5.43) below show that when the last syllable of a stem contains a low vowel (/a/) then this

vowel will be phonetically realised as a front high vowel ([i]) in the second part of a reduplication; meanwhile when the first syllable of the stem contains a round back vowel (/u/ - cf. 5.43:1 or /o/ - cf. 5.43:2,3), this vowel will be phonetically realised as a low vowel ([a]) in the second part of the derivation.

- (5.43) 1. /luntaŋ + luntaŋ/ [luntaŋ lantɪŋ] 'bobbing'
 2. /čompaŋ + čompaŋ/ [čompaŋ čampɪŋ] 'torn (in rags)'
 3. /porak + porak/ [pora? parɪ?] 'disordered'
 4. /gərak + gərak/ [gəra? gərɪ?] 'movements, behavior'
 5. /pə muda + pə muda/ [pə muda pə mudɪ] 'youths'
 6. /basa + basa/ [basa basɪ] 'good manners' etc.

Examples (5.42) and (5.43) show that the last vowel of the first part of a derivation (reduplication) is always a low vowel ([a]). Accordingly, when the last vowel of a stem is not /a/, the vowel change(s) will take place in the first part of a reduplication. In such case, the last vowel of the stem will become low and the first vowel, if /a/, will become [o] (cf. 5.42:1-3). And when the last vowel of a stem is /a/, the vowel change(s) will occur in the second part of a derivation. In such case, the last vowel will become [i] (cf. 5.43), and the first vowel, if /u/ or /o/, will become [a] (cf. 5.43:1-3).

The vowel change phenomenon illustrated by examples (5.42) and 5.43) above may be termed vowel 'dissimilation'. Since the vowel dissimilation occurs only in certain words constructed by means of reduplication, the above stems and the like must be marked '+P-rule 25' in the lexicon.

It must be noted that vowel changes described above may or may not occur on the phonetic level. Therefore, P-rule 25 set up below has to be regarded as an optional rule.

P-rule: Vowel dissimilation (optional)

(25) a. ++ C $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \langle +\text{Low} \rangle \end{bmatrix}$ C(V)(C) $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \end{bmatrix}$ (C) ++ ---->

1 2 3 4 5 6 7 8 9

1 2 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \\ \langle -\text{High} \rangle \\ +\text{Round} \end{bmatrix}$ 4 5 6 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ 8 9 / ----- 23456789

b. ++ C $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \langle +\text{Round} \rangle \end{bmatrix}$ C(V)(C) $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ (C) ++ ---->

1 2 3 4 5 6 7 8 9

2 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \langle +\text{Low} \rangle \end{bmatrix}$ 4 5 6 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \\ -\text{Back} \end{bmatrix}$ 8 9 / 123456789 -----

where C stands for any consonant and V for any vowel
The first part of the rule (a) says that:

- a) a non-low vowel occurring in the final syllable of a stem will be phonetically realised as [a] ([-Consonant, +Syllabic, +Low,]) in the first part of a word constructed by means of reduplication (cf. 5.42).
- b) and when the first vowel is specified as a low vowel then

it will be phonetically realised as [o] ([-Consonant, +Syllabic, -Low, -High, +Round]) in the first part of the derivation (cf. 5.42:1-3)

The second part of the rule (b) says that

- a) a low vowel occurring in the final syllable of a stem will be phonetically realised as [i] ([-Consonant, +Syllabic, +High, -Back]) in the second part of a (typical) word constructed by means of reduplication (cf. 5.43);
- b) and when the first vowel of the stem is further specified as a round vowel, then it will be phonetically realised as [a] ([-Consonant, +Syllabic, +Low]) in the second part of the derivation (cf. 5.43:1-3).

5.9 Loan Word Endings

It was stated in Section 1.1 that Dutch and English (and also Arabic) play a significant role in the development of BI, especially in the enrichment of its vocabulary. In this section we are going to examine a number of doublets in words borrowed from Dutch and English.

Examples (5.44) below show the alternation between the (non-morphemic) endings -tas and -tet in a number of nouns which end in -ty or -teit in English and Dutch respectively. Historically speaking, the -tet ending is much earlier than the -tas. At present however, forms ending in -tet are less commonly used. This is partly because the -tet ending sounds very Dutch and partly because BI imposes constraints on the occurrence of /e/

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in word final syllable. (In native BI items /e/ may occur in the last syllable but the preceding vowel must be /e/ or /o/).

- (5.44) /kualitet/ [kualitas - kulitɛt] 'quality'
 /kuantitet/ [kuan^titas - kuantitɛt] 'quantity'
 /aktifitet/ [aktifitas - aktifitɛt] 'activity'
 /mayoritet/ [mayoritas - mayoritɛt] 'majority'
 /minoritet/ [minoritas - minoritɛt] 'minority' etc.

Examples (5.45) below show the alternation between the endings -al and -il in a number of (cognate) words which usually end in -al or -el in English and Dutch respectively. Again, the ending -il is historically much earlier than the ending -al. At present however, there is a strong tendency to substitute -al for -il.

- (5.45) /kulturil/ [kultural - kulturil] 'cultural'
 /materiil/ [materⁱial - materi:l] 'material'
 /səpirituil/ [spiritual - spirituil] 'spiritual'
 /indifiduil/ [indifidual - indifiduil] 'individual'
 /konsətitusionil/ [konstitusional - konstitusionil]
 'constitutional' etc.

The phenomenon illustrated by examples (5.44) and (5.45) above can be formalised as follows.

P-rule: Loan word endings (optional)

- (26) a. X $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \\ -\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{High} \\ -\text{Back} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \\ -\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{bmatrix}$ ++ ---->
- 1 2 3 4 5

$$\begin{array}{ccccc}
 1 & 2 & \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix} & \begin{bmatrix} +\text{Cons} \\ -\text{Voice} \\ +\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{bmatrix} & 5
 \end{array}$$

$$\begin{array}{ccccccc}
 \text{b.} & X & \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \\ -\text{Back} \end{bmatrix} & \begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ +\text{Cont} \end{bmatrix} & ++ & \text{---->} & 1 \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix} & 3 & 4 \\
 & 1 & 2 & 3 & 4 & & & &
 \end{array}$$

where X stands for any segment sequences.

Rule (26a) says that the ending /-tet/ in loan words may optionally be realised as [-tas] on the phonetic level; and Rule (26b) says that the ending /-il/ in loan words may optionally be realised as [-al] on the phonetic level.

5.10 Stress Placement

It has been pointed out in Sub-section 2.2.5 that stress in BI is not phonemic because its placement in words is highly predictable. As stated earlier in the introduction of this chapter, the main concern here is to account for stress placement on the word level. Specifically, this section will be concerned with the formulation of rules that will correctly assign stress to words in citation. At this point, it is necessary to note that stress placement in a given word may not on the same syllable in all cases. There are some instances where syntactical factors, which are not our concern here, may

cause the shift of stress placement in words. Prefixes, for example, are basically unstressable on the word level. On the sentence level however, stress placement in words may be shifted to the prefixes to signal grammatical contrasts.⁵

It has been widely agreed by linguists that stress is a supra-segmental feature of utterances which applies to whole syllables rather than to individual vowels and consonants. Linguistically speaking, the purpose of stress assignment is to mark one syllable and only one syllable per word (or per stress unit) as carrying prominence (cf. Hyman, 1975: p.204; Ladefoged, 1975:p. 222 etc).

As far as prominence is concerned, there is only one degree of stress to be recognized in BI words (including compounds and phrases). All other unstressed syllables within a word (or compound or a phrase) are pronounced with approximately the same amount of energy each.

Let us observe some examples of the distribution of stress in BI words. Note that in the following examples (5.46) each number consists of a group of related items. Note furthermore, that the a-items below are stems (monomorphemic words) while the b- and c-items are derivatives (polymorphemic words).

5. For a detailed account of stress placement in words on the sentence level, and a comprehensive review of earlier studies on suprasegmental aspects of BI, the reader is referred to Halim (1974) Chapters 3 and 2 respectively.

- (5.46)
1. a. /t i k/ [t í k] 'to type'
b. /di + tík/ [ditík] 'to be typed'
c. /di+ tík + kan + pa/ [ditikánpa] 'typed by him'
 2. a. /ś a h/ [sáh, śáh] 'legal'
b. /tər + śah/ [tərsáh] 'the most legal/authentic
(one)'
c. /di + śah +kan +pa/ [disahkánpa] 'legalized by
him'
 3. a. /duduk/ [dúdʷ?] 'to sit'
b. /pə + mən + duduk/ [pəndúdʷ?] 'population'
c. /mən + duduk + i/ [məndudúki] 'to occupy'
 4. a. /tərima/ [təríma] 'to get, receive (root)'
b. /mən + tərima/ [mənəríma] 'to receive, get'
c. /pə + mən + tərima + an + mu/ [pənərimaʔánmu]
'your acceptance'
 5. a. /səlamat/ [səlāmat] 'safe'
b. /pə + mən + səlamat/ [pəpəlāmat] 'the person
who saved'
c. /kə + səlamat + an/[kəsəlamátan] 'safety'

Examples (5.46:1a,2a) are monosyllabic and therefore the stress is automatically assigned to them. The general pattern of the placement of stress in polysyllabic items shown by the above examples is on the penultimate syllable regardless of whether the penult is part of a stem or not (cf.5.46_1c,2c,3,4,5). Examples (5.46:1b,2b) however, show that the placement of stress is on the last syllable rather than on the penultimate syllable of the words. This means that the prefixes do not affect the placement of stress

in words.

Examples (5.47) below show that the placement of stress in a word is also shifted from the penultimate syllable when the vowel of the penult is a schwa.

- (5.47) 1. / əmpat / [əmpát] 'four'
 / bəri / [bərí] 'to give'
 / sərəm / [sərém] 'frightening'
2. / sətəru/ [sətə́rú] 'enemy'
 / čəndəruŋ / [čəndə́rǎŋ] 'to be bound'
 / səbəraŋ / [səbə́rǎŋ] 'the otherside, to cross'
3. / putəri/ [púteri, pútri] 'girl, daughter'
 / karəna/ [kárana, kárna] 'because'
 / čəritəra/ [čə́ritəra, čə́ritra] 'story' etc.

Notice that when a word is bisyllabic and the vowel of the first (penultimate) syllable is a schwa, the stress will be assigned to the final syllable (cf.5.47:1). But when the word in question consists of three or more syllables, and the vowel of the penultimate syllable is a schwa, the stress will be assigned to the antepenult (cf.5.47:3) provided that the vowel of the antepenult is not a schwa in which case the stress will be assigned to the final syllable (cf. 5.47:2).

Let us now observe some examples of the placement of stress in larger units. Specifically, the following examples show the placement of stress in reduplicated forms (cf.5.48:1,2), in compound words (cf.5.48:3,4) and in simple phrases (cf.5.48:5,6). For comparison, the placement of stress in the components (or elements) of each unit is also given.

- (5.48)
1. /pə+mən+minta + minta/ [pəˈminta mɪnta] 'beggar'
 - a. /minta/ [mɪnta] 'to ask (for)'
 - b. /pə+mən+minta/ [pəˈmɪnta] 'the person who asked (for)'
 2. /anak+anak+pa/ [ana? aná?pa] 'his/her children'
 - a. /anak/ [ána?] 'child'
 - b. /anak+pa/ [aná?pa] 'his/her child'
 3. /tanda mata/ [tanda máta] 'souvenir, keepsake'
 - a. /tanda/ [tánda] 'sign, token'
 - b. /mata/ [máta] 'eye'
 4. /rumah sakit/ [rumah sákɪt] 'hospital'
 - a. /rumah/ [rúmah] 'house'
 - b. /sakit/ [sákɪt] 'ill'
 5. /rumah bər+tiŋkat/ [rumah bərtiŋkat] 'storeyed building'
 - a. /rumah/ [rúmah] 'house'
 - b. /bər+tiŋkat/ [bərtiŋkat] 'having storeys'
 6. /tukan tik/ [tukan tík] 'typist'
 - a. /tukan/ [túkan] 'workman'
 - b. /tik/ [tík] 'type'

The above examples show that the placement of stress in units that consist of two or more lexical formatives each is on one of the syllables of the last component of each unit in accordance with the stress placement rules illustrated by examples (5.46) and (5.47) above.

The distribution (placement) of stress on the word level illustrated by examples (5.46) through (5.48) above can be summed up as follows.

- i. The placement of stress in words which consist of one lexical formative each with or without any affixes added to them will be on the penultimate syllable except under the following circumstances.
 - a) The word in question is monosyllabic which, by definition, consists of only one syllable and therefore the stress will be automatically assigned to it.
 - b) The vowel (nucleus) of the penultimate syllable of the word in question is part of a prefix, in which case the stress will be assigned to the final syllable of the word.
 - c) The vowel of the penultimate syllable of the word in question is a schwa, in which case the stress will be assigned to the final syllable when the word consists of two syllables only or the syllable before the penult contains a schwa or belong to a prefix, and to the syllable before the penult provided that it does not contain a schwa or belong to a prefix.
- ii. The placement of stress in a larger unit (i.e. a unit that consists of two or more lexical formatives with or without any affixes) will be in the last component of the unit (i.e. the part that contains the last lexical formative of the unit) in accordance with rule (i) above.

Obviously, the relevant category for the placement of stress in BI is a phrase boundary (\square) rather than a full word boundary. Although stress applies to the whole

syllable, it is a common practice in generative phonology to assign the stress to the vowel of the stressed syllable. The stress placement described above can be formulated as follows.

P-rule: Stress placement.

- (27) a.
$$\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix} \longrightarrow [+Stress] / X ++ \left\{ \begin{array}{l} C \text{ ----- } (C) \text{ } \square \\ Y \left[\begin{array}{l} \text{-----} \\ /+Back \backslash \\ \backslash -Round / \\ \langle +Low \rangle \end{array} \right] (C) \dots \\ \dots (C_0 \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Back} \\ -\text{Round} \\ -\text{Low} \end{bmatrix} C_0)_0 C_0 VC_0 \text{ } \square \end{array} \right\}$$
- b.
$$\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \end{bmatrix} \longrightarrow [+Stress] / X ++ (C_0 \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Back} \\ -\text{Round} \\ -\text{Low} \end{bmatrix} C_0)_1 C_0 \text{ --- } C_0 \text{ } \square$$

where C stands for any consonant, V for any vowel, X and Y can be either null or non-null, (++) for a word boundary and (□) for a phrase boundary.

Rule (27a) says that stress will be assigned to (a) the last vowel of a unit (phrase) if the last component of the unit is a monosyllabic lexical formative with or without any prefixed added to it, and (b) to the (first) non-schwa vowel before the last vowel in the unit. The word boundary (++) prevents the rule from applying to

prefixes if the last component of the unit has prefixes. Rule (27b) says that stress will be assigned to the final vowel of the unit if the preceding vowel(s) has (have) the feature specifications [-Consonant,+Syllabic,+Back,-Round,-Low]. The word boundary (++) prevents the rule from applying to prefixes.

5.11 Summary of P-rules

This section presents the summary of the phonological rules proper (P-rules) set up in the previous sections. The rule numbers given below are the same as those that appear in the previous sections.

1) Degemination (see Sub-section 5.1.1)

$$\begin{bmatrix} C \\ Fn \end{bmatrix} + \begin{bmatrix} C \\ Fn \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ Fn \end{bmatrix}$$

where C = consonant; Fn = a specific bundle of features.

2) Trill deletion (see Sub-section 5.1.2)

$$\begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \\ -\text{Cont} \end{bmatrix} \longrightarrow \emptyset / +\text{CV}_a \text{ ---- ++} \left\{ \begin{array}{l} \begin{bmatrix} -\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \\ -\text{Cont} \end{bmatrix} \\ C \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Back} \\ -\text{Round} \\ -\text{Low} \end{bmatrix} \begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ -\text{Nasal} \\ -\text{Cont} \end{bmatrix} C \end{array} \right\} X$$

where C = any consonants

CV_a = /bʌ-/, /pə-/ and /tə-/

X = a sequence of segments beginning with a vowel

3) Glottal stop insertion (see Sub-section 5.2.1)

$$\emptyset \text{ -----} \rightarrow \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ -\text{Voice} \\ -\text{Cont} \end{bmatrix} / \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \alpha \text{ High} \\ \beta \text{ Low} \\ \gamma \text{ Round} \end{bmatrix} (+) \text{ -----} \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \alpha \text{ High} \\ \beta \text{ Low} \\ \gamma \text{ Round} \end{bmatrix}$$

4) Glottal stop realisation of /k/ (see Sub-section 5.2.2)

$$\begin{bmatrix} +\text{Cons} \\ -\text{Syll} \\ -\text{Voice} \\ +\text{Back} \\ -\text{Low} \\ -\text{Cont} \end{bmatrix} \text{ -----} \rightarrow \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ -\text{Voice} \\ +\text{Back} \\ +\text{Low} \\ -\text{Cont} \end{bmatrix} / \text{ -----} ++ \text{ (CVC+)}$$

where C = any consonants; V = any vowels

5) Deletion of /h/ (optional) (See Sub-section 5.3.1)

$$\begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ -\text{Voice} \\ +\text{Cont} \end{bmatrix} \text{ -----} \rightarrow \emptyset / \left\{ \begin{array}{l} \langle V_a \rangle \text{ -----} ++ \left(\left\{ \begin{array}{l} \text{CVC}_o \\ \langle V_b \text{ } c_o \rangle \end{array} \right\} + \right) \\ \begin{bmatrix} \alpha \text{ High} \\ -\alpha \text{ Low} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \text{ -----} \begin{bmatrix} -\alpha \text{ High} \\ \alpha \text{ Low} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \left(\begin{bmatrix} -\text{Syll} \end{bmatrix} \right) ++ \\ \langle +\text{Son} \rangle \\ \langle +\text{Nasal} \rangle \end{array} \right. \begin{array}{l} \text{Verb} \\ \text{Adj} \end{array}$$

where C = any consonants; V = any vowels; $V_a \neq V_b$

6) Syllable reduction (optional) (see Subsection 5.3.2)

$$++ \text{ C } \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix} \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Low} \\ -\text{Cont} \end{bmatrix} \text{ V C' V (C V) } ++$$

1 2 3 4 5 6 7 8 9 10

-----> 1 2 $\emptyset \emptyset$ 5 6 7 8 9 10

where C = any consonants; V = any vowels

7) Voicing of /h/ (optional) (see Sub-section 5.3.3)

$[-\text{Voice}] \rightarrow [+Voice] / V \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Low} \\ +\text{Cont} \end{bmatrix} (+) V$

where V = any vowels

8) Place adjustment of /h/ (see Sub-section 5.3.4)

$\begin{bmatrix} +\text{Low} \\ -\text{High} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{Low} \\ \alpha \text{High} \end{bmatrix} / \begin{bmatrix} -\text{Cons} \\ -\text{Syll} \\ +\text{Cont} \end{bmatrix} \begin{bmatrix} -\text{Low} \\ \alpha \text{High} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix}$

9) De-spirantization (Naturalization) of /f/ (optional)
(see Sub-section 5.4.1)

$[+\text{Continuant}] \rightarrow [-\text{Continuant}] / \begin{bmatrix} +\text{Cons} \\ +\text{Ant} \\ -\text{Cor} \\ -\text{Voice} \end{bmatrix}$

10) Naturalization of /z/ (optional) (see Sub-section 5.4.2)

a. $[+\text{Voice}] \rightarrow [-\text{Voice}] / \begin{bmatrix} +\text{Cons} \\ -\text{Son} \\ +\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \\ -\text{Back} \end{bmatrix}$

$$b. \begin{bmatrix} +Ant \\ +Cor \\ +Cont \end{bmatrix} \longrightarrow \begin{bmatrix} -Ant \\ -Cor \\ -Cont \end{bmatrix} / \begin{bmatrix} \text{-----} \\ \text{-----} \\ \text{-----} \\ +Cons \\ +Voice \\ -Back \end{bmatrix}$$

11) Fronting (Naturalization) of /ʒ/ (optional)(see Sub-section 5.4.3)

$$\begin{bmatrix} -Ant \\ -Cor \end{bmatrix} \longrightarrow \begin{bmatrix} +Ant \\ +Cor \end{bmatrix} / \begin{bmatrix} \text{-----} \\ \text{-----} \\ -Voice \\ +Cont \\ -Back \\ +Cons \end{bmatrix}$$

12) Naturalization of /x/ (optional)(see Sub-section 5.4.4)

$$\begin{bmatrix} +Cons \\ +Cont \\ -Voice \\ +High \end{bmatrix} \longrightarrow \left\{ \begin{array}{l} a. \begin{bmatrix} +Cons \\ -Cont \\ -Voice \\ +High \end{bmatrix} \\ b. \begin{bmatrix} +Cons \\ -Cont \\ +Voice \\ +High \end{bmatrix} \\ c. \begin{bmatrix} -Cons \\ +Cont \\ -Voice \\ -High \end{bmatrix} \end{array} \right\} / \begin{bmatrix} \text{-----} \\ \text{-----} \\ \text{-----} \\ \text{-----} \\ -Syll \\ -Son \\ +Back \end{bmatrix}$$

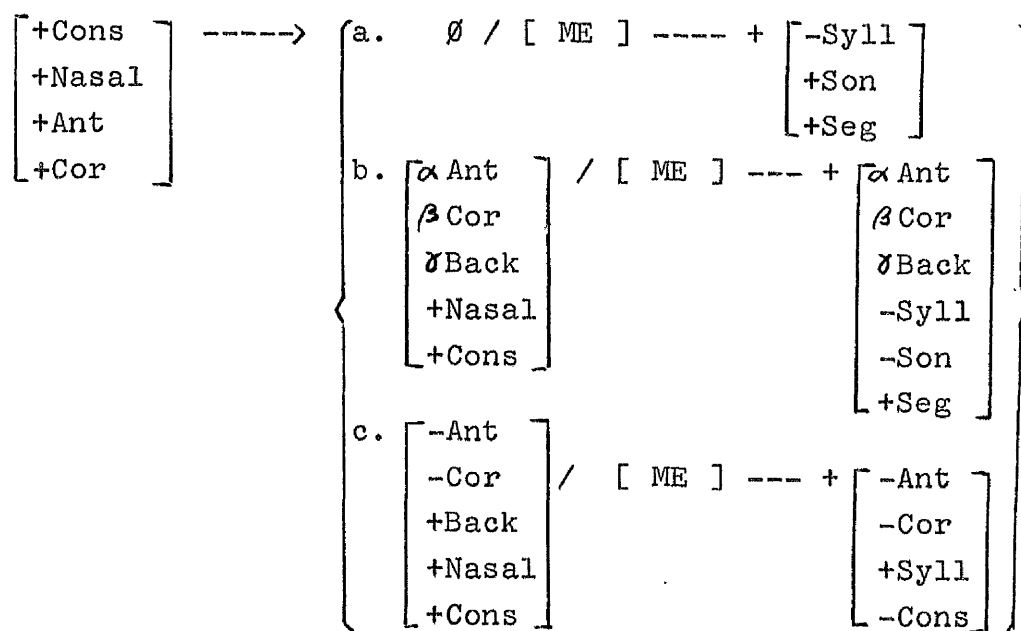
13) Schwa insertion (optional)(see Sub-section 5.5.1)

$$\emptyset \longrightarrow \begin{bmatrix} -Cons \\ +Syll \\ -High \\ -Low \\ +Back \\ -Round \end{bmatrix} / [MEN] \text{-----} ++CVC++$$

where MEN = /mən/ 'active voice verb prefix'

++CVC++ = monosyllabic stems

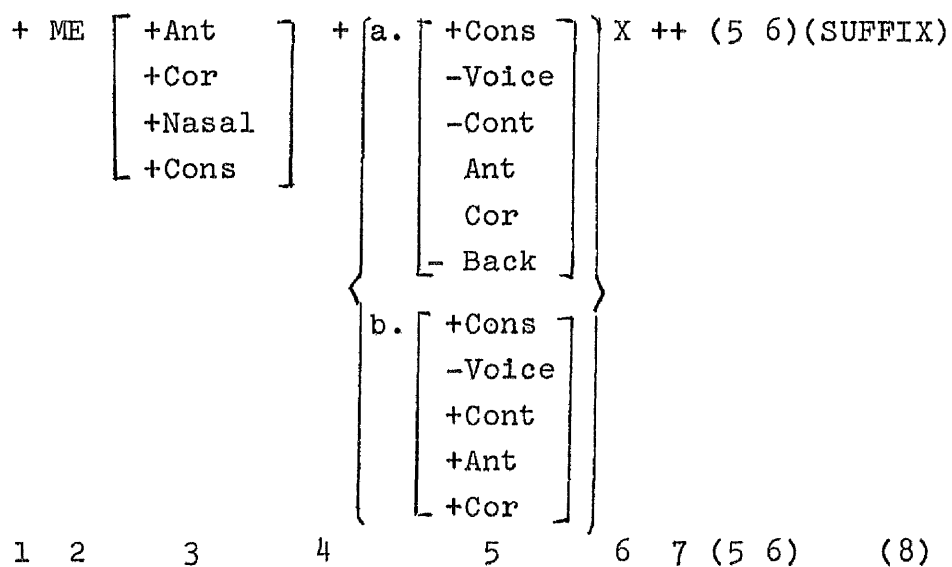
14) Nasal deletion and assimilation (see Sub-section 5.5.1)



where ME = the first two segments of /mən/

Seg = segment (i.e. consonant or glide)

15) Consonant coalescence (see Sub-section 5.5.1)



$$\begin{array}{c}
 \text{-----} \rightarrow 1 \quad 2 \quad \left\{ \begin{array}{l} \text{c.} \left[\begin{array}{l} -\alpha \text{Ant} \\ \beta \text{Cor} \\ -\alpha \text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \\ \\ \text{d.} \left[\begin{array}{l} -\text{Ant} \\ -\text{Cor} \\ -\text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \end{array} \right\} 6 \quad 7 \quad \left(\begin{array}{l} \text{e} \left[\begin{array}{l} -\alpha \text{Ant} \\ \beta \text{Cor} \\ -\alpha \text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \\ \\ \text{f} \left[\begin{array}{l} -\text{Ant} \\ -\text{Cor} \\ -\text{Back} \\ +\text{Nasal} \\ +\text{Cons} \end{array} \right] \end{array} \right) 6) \quad (8) \\
 (345) \qquad \qquad \qquad (345)
 \end{array}$$

Condition: if a, then c and e; if b, then d and f

ME = the first two segments of /mən/

X = sequence of segments beginning with a vowel

- 16) Deletion of the first two segments of /mən/ (see Sub-section 5.5.2)

$$\left[\text{ME} \right] \text{ -----} \rightarrow \emptyset \text{ /+PE + } \left[\begin{array}{l} +\text{Cons} \\ +\text{Nasal} \\ +\text{Ant} \\ +\text{Cor} \end{array} \right] + \text{STEM (SUFFIX)}$$

where ME = the first two segments of /mən/

PE = /pə/

- 17) Vowel laxing (see Sub-section 5.6.1)

$$\left[\begin{array}{l} -\text{Cons} \\ +\text{Syll} \end{array} \right] \text{ -----} \rightarrow \left[-\text{Tense} \right] \text{ / } \left[\text{-----} \right] \text{ C ++}$$

where C = any consonants

- 18) Vowel retraction (optional) (see Sub-section 5.6.2)

$$\left[-\text{Back} \right] \text{ -----} \rightarrow \left[+\text{Back} \right] \text{ / X } \left[\begin{array}{l} \text{-----} \\ -\text{High} \\ -\text{Low} \\ -\text{Round} \\ +\text{Syll} \\ -\text{Cons} \\ -\text{Stress} \end{array} \right] \text{ } C_0^2 \text{VC}_0 \text{VC}_0 (C_0 \text{VC}_0) \text{ ++}$$

where X = any segment sequences or null

19) Schwa deletion (optional)(see Sub-section 5.6.3)

$$\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \\ +\text{Back} \\ -\text{Round} \end{bmatrix} \text{ -----} \rightarrow \emptyset / X \text{ [-----]} C_O^2 V C_O (V C_O) ++$$

where C = any consonants; V = any vowels

X = any sequence of segments or null

20) Vowel nasalization (optional)(see Sub-section 5.6.4)

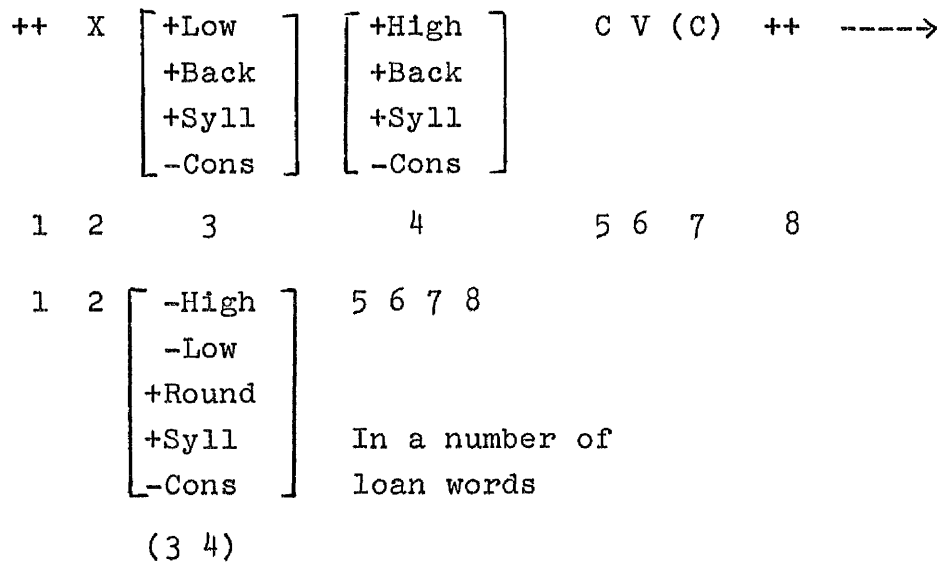
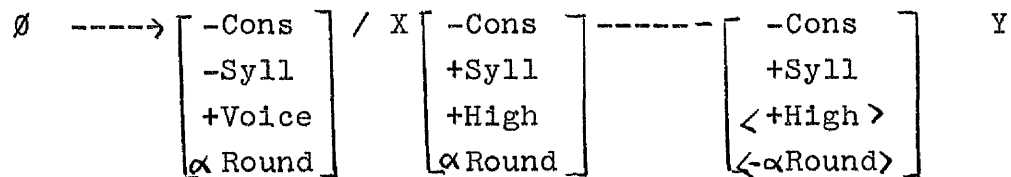
$$[-\text{Nasal}] \text{ -----} \rightarrow [+ \text{Nasal}] / X \left\{ \begin{array}{l} \begin{bmatrix} +\text{Cons} \\ +\text{Nasal} \end{bmatrix} \begin{bmatrix} \text{-----} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \\ \begin{bmatrix} \text{-----} \\ +\text{Syll} \\ -\text{Cons} \\ +\text{Low} \end{bmatrix} \begin{bmatrix} \text{-----} \\ +\text{Syll} \\ -\text{Cons} \\ +\text{Low} \end{bmatrix} \end{array} \right\} Y \quad \text{In Arabic words}$$

where X, Y = any sequence of segments

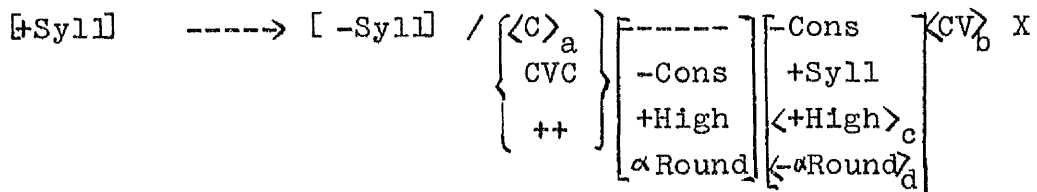
21) Lowel lowering (optional)(see Sub-section 5.6.5)

$$\text{a. } [+ \text{High}] \text{ -----} \rightarrow [- \text{High}] / \begin{bmatrix} \text{-----} \\ -\text{Low} \\ \text{Round} \\ \text{Back} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \quad \text{In a number of items}$$

$$\text{b. } [- \text{Low}] \text{ -----} \rightarrow [+ \text{Low}] / \begin{bmatrix} \text{-----} \\ -\text{High} \\ +\text{Back} \\ -\text{Round} \\ +\text{Syll} \\ -\text{Cons} \end{bmatrix} \quad \text{In a number of items}$$

22) Vowel coalescence (optional) (see Sub-section 5.6.6)23) Glide insertion (optional) (see Sub-section 5.7.1)

where X, Y = any segment sequence or null

24) Desyllabication (optional) (see Sub-section 5.7.2)

Condition: If a, then b; if c, then d

C = any consonants; V = any vowels

X = any segment sequences or null

25) Vowel dissimilation (optional)(see Section 5.8)

a. ++ C $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \text{<+Low>} \end{bmatrix}$ C(V)(C) $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \end{bmatrix}$ (C) ++ ----->

1 2 3 4 5 6 7 8 9

1 2 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{Low} \\ -\text{High} \\ +\text{Round} \end{bmatrix}$ 4 5 6 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ 8 9 /----- 2 3 4 5 6 7 8 9

b. ++ C $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \text{<+Round>} \end{bmatrix}$ C(V)(C) $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ (C) ++ ----->

1 2 3 4 5 6 7 8 9

2 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ \text{<+Low>} \end{bmatrix}$ 4 5 6 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \\ -\text{Back} \end{bmatrix}$ 8 9 /1 2 3 4 5 6 7 8 9 ----

where C = any consonants; V = any vowels

26) Loan word endings (optional)(see Section 5.9)

a. X $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \\ -\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{bmatrix}$ $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ -\text{High} \\ -\text{Back} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \\ -\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{bmatrix}$ ++ ----->

1 2 3 4 5

1 2 $\begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix}$ $\begin{bmatrix} +\text{Cons} \\ -\text{Voice} \\ +\text{Cont} \\ +\text{Ant} \\ +\text{Cor} \end{bmatrix}$ 5

$$\begin{array}{ccccccc}
 \text{b.} & X & \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{High} \\ -\text{Back} \end{bmatrix} & \begin{bmatrix} +\text{Cons} \\ +\text{Son} \\ +\text{Cont} \end{bmatrix} & ++ & \text{---->} & 1 \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Low} \end{bmatrix} & 3 & 4 \\
 & 1 & 2 & 3 & 4 & & & &
 \end{array}$$

where X stands for any segment sequences.

27 Stress placement (see Section 5.10)

$$\begin{array}{l}
 \text{a.} \quad \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix} \text{ ---->} [+ \text{Stress}] / X ++ C \text{ ---->} (C) \\
 \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad Y \begin{bmatrix} \text{---->} \\ +\text{Back} \\ -\text{Round} \\ \text{<+Low>} \end{bmatrix} (C) \dots
 \end{array}$$

$$\dots (C_0 \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Back} \\ -\text{Round} \\ -\text{Low} \end{bmatrix} C_0)_0 C_0 V C_0$$

$$\begin{array}{l}
 \text{b.} \quad \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \end{bmatrix} \text{ ---->} [+ \text{Stress}] / X ++ (C_0 \begin{bmatrix} -\text{Cons} \\ +\text{Syll} \\ +\text{Back} \\ -\text{Round} \\ -\text{Low} \end{bmatrix} C_0)_1 C_0 \text{ ---->} C_0
 \end{array}$$

where C = any consonants

V = any vowels

X, Y = any sequence of segments or null

= phrase boundary

CHAPTER 6
SUMMARY AND CONCLUSIONS

It was stated in Chapter 1 that the primary goal of this thesis is to present a phonological description of BI within a transformational generative framework. The description presented in the thesis centers around (1) the problem of the representation of BI morphemes both on the phonological and phonetic levels (cf. Chapter 2), (2) the problem of the range of possible (or well-formed) morphemes and segments in BI (cf. Chapters 3 and 4) and (3) the problem of phonetic forms of BI morphemes which, under certain circumstances, become different from their respective phonological (underlying) forms (cf. Chapter 5).

We saw in Chapter 2 that BI requires 22 consonantal (non-syllabic) segments (i.e. 18 native and 4 loan segments) and six vowels for the representation of morphemes on the phonological level. It was argued that the glottal stop ([ʔ]) is not relevant on the phonological level of representation, despite the fact that the segment is phonemic in traditional (or autonomous) phonemic analysis. It was demonstrated that [ʔ] is basically a phonetic realisation of the underlying /k/ in morpheme final position. (When in morpheme mid position, [ʔ] functions to break up sequences of identical vowels on the phonetic level. In other words, [ʔ] in morpheme mid position is phonologically represented by zero). It was pointed out that the velar stop ([k]) realisation of final /k/ in words like /p a k/ [pak] 'package',

/politik/ [politik] 'politics', /fanatik/ [fanatik] 'fanatic' etc., which is not observed in native BI items can be accounted for by making use of the historical information about the items. The historical (etymological) information also explains the free variability between certain sounds, such as [p] and [f] in words like pikir, 'to think, paham 'to comprehend, ideology', pihak 'side' etc., [z] and [ʃ] or [s] in words like zaman 'era', ijazah 'diploma', azas 'principle' etc., [ʃ] and [s] in words like syah 'legal', syarat 'requirements', masyarakat 'society' etc., [x] and [k] in words like khobar 'news', khas 'typical', akhir 'end' etc. It was concluded that such (loan) items have to be phonologically represented with the loan segments irrespective of their history in the language. Thus the items pikir [pikīr, fikīr] 'to think', jaman/zaman [ʃaman, zaman, saman] 'era', masarakat/masyarakat [masarakat, maʃarakat] 'society', khobar/ka.bar [kabar, xabar, habar] 'news' etc. are respectively represented as /fikir/, /zaman/, /maʃarakat/ and /xabar/ on the phonological level despite the fact that these items do not sound foreign to many speakers of BI in the sense that they are always pronounced with the native sound substitutes. And probably many speakers do not know that they are loan words. The motivation behind this approach is to make the grammar simple.

We saw furthermore, that the 22 consonantal segments and the six vowels can be kept distinct one another by making use of 12 (classificatory) features. It was stated

that stops and affricates are not differentiated in terms of release features because in BI stops (/p, b, t, d, k, g/) are all non-palatal consonants, while affricates (/tʃ, dʒ/) are both palatal sounds. In other words, the place features anterior, coronal and back are sufficient to keep stops and affricates apart. As far as the native speakers of BI are concerned, the feature specifications [+Delayed release] for affricates and [-Delayed release] for stops are redundant. From the point of view of the linguist, who has a far more complicated sound system, the release features are certainly crucial in order to differentiate, for example, the voiceless labial stop [p] from the corresponding affricate [pf] or the voiceless palatal affricate [tʃ] (=IPA [tʃ]) from the corresponding stop [c] etc. The grammar however, is intended as a description of the competence of BI native speakers. Therefore, one finds no need to differentiate stops from affricates by release features.

Chapter 3 presents the specifications of well-formed morphemes in BI in terms of 'positive conditions'. It was stated, among other things, that a consonant cluster in BI may consist, on the basis of the observation of native BI items, of two consonants only and it may occur in morpheme-medial position only. It was also stated that the positive conditions hold true mainly with native BI morphemes. It was noted that loan items which do not meet those positive conditions must be represented in such a way on the phono-

logical level, i.e. by inserting schwa, so that their underlying forms satisfy those conditions. Thus (loan) items like klinik [klinik, kəlinik] 'clinic', struktur [struktur] 'structure', instruksi [instruksi] 'instruction' etc. must respectively be represented on the phonological level as /kəlinik/, /səstruktur/ and /insətruksi/. The inserted schwa is later deleted by a phonetic realisation rule (cf. P-rule 19). The postulation of schwa (/ə/) in the underlying representation of the above loan words is artificial in the sense that educated speakers never realise the schwa on the phonetic level. Obviously, this phenomenon needs a further investigation.

In addition to the positive conditions, Chapter 3 also presents the discussion of a certain type of words (derivatives) which are usually accounted for in an ad hoc way in earlier studies. It was demonstrated that the related pairs (i.e. forms derived from the same stem) such as pekerja [pəkərʃa] 'workman' vs. pengerja [pənərʃa] 'the executor of a job', peserta [pəsərtə] 'participant' vs. penyerta [pənərta] 'a company (friend)', pesuruh [pəsuruh] 'a janitor' vs. penyuruh [pənuruh] 'the person who gave order' etc. can be explained in a phonologically plausible way by establishing two different types of underlying structure, namely (1) PE + STEM (for the first set of the items) and (2) PE + MEN + STEM (for the second set of the items). The analysis explains why stem-initial consonants in the first set of the items do not undergo

any change when preceded by the prefix PE (/pə/) 'agent noun forming prefix' as they do in the second set. In this respect, a transformational generative analysis is clearly more powerful than a structuralism-based analysis.

In Chapter 4 the question of the morpheme well-formedness is further discussed. It was pointed out, among other things, that BI imposes constraints on the type of consonants that may occur in a sequence. Voiced consonants that may occur as the first element of a consonant cluster, for example, are very limited. We saw that only sonorant consonants (nasals and liquids) may precede voiced as well as voiceless consonants. We also saw that voiced consonants that may occur in morpheme-final position are limited to sonorant consonants. The last-mentioned condition is strong in the sense that a loan item ending in a non-sonorant voiced consonant in the source language always ends in the corresponding homorganic voiceless consonant in BI such as sebab [səbap] 'because, cause' (Arabic), Ahad [ahat] 'Sunday' (Arabic), klub [klɒp, kəlɒp] 'club' (Dutch/English) etc. Notice that the initial consonant cluster in klub may be preserved on the phonetic level. In other words, the constraint on the initial consonant cluster is less strong compared with the constraint on consonants in morpheme-final position.

It was also shown that by making use of the historical information about words, true linguistic

generalisations can be made to the extent that common morpheme structures (i.e. structures which occur in native BI items and to some degree in loan items) can be distinguished from uncommon ones (i.e. structures which occur in loan words only).

In Chapter 5 the discussion was directed to the formulation of phonological rules proper (P-rules) or phonetic realisation rules. We saw that BI 'Standard Pronunciation' requires about 30 P-rules to account for variations in shape that morphemes undergo in various environments.

As stated in Section 1.2, this thesis is an introduction to the phonology of BI. As an introduction, it invites further research to confirm, supplement and even to refute the findings reported in this thesis.

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